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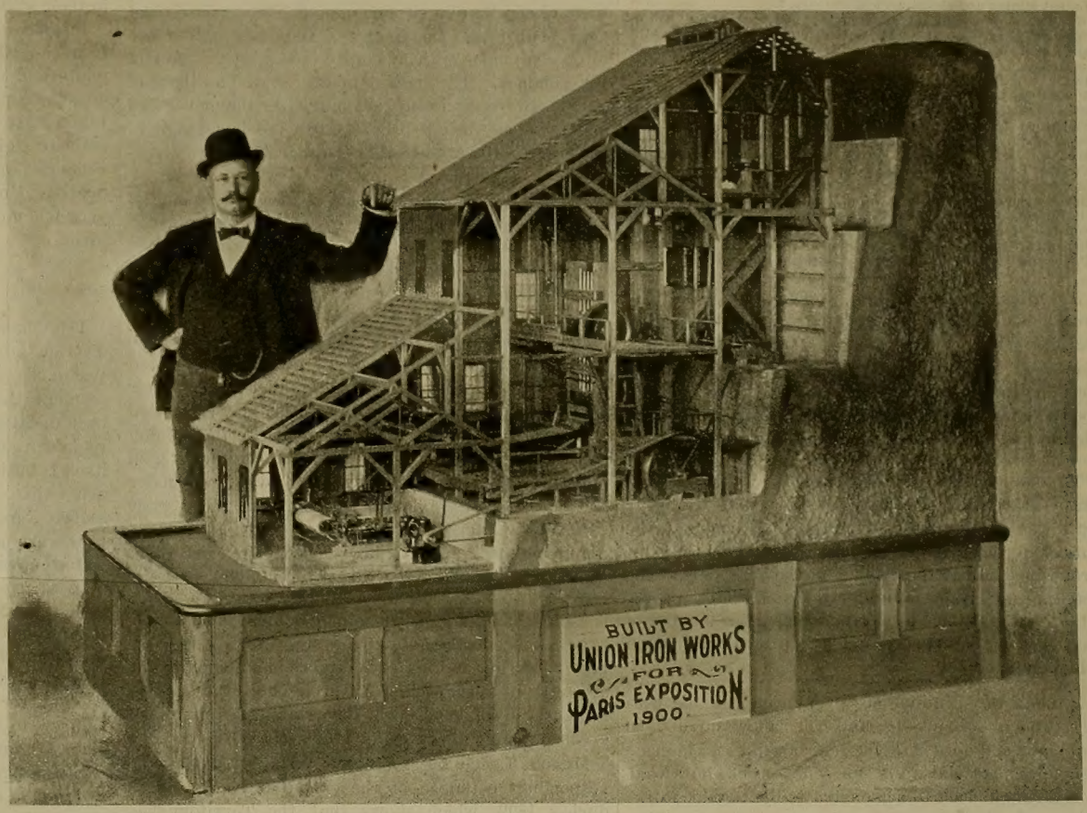
AND PACIFIC ELECTRICAL REVIEW.

No. 2061.—VOLUME LXXX. Number 1. SAN FRANCISCO, SATURDAY, JANUARY 6, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A California Contribution.

The world will be on view at Paris next year, and American miners will have prominent part in the great show. It will be occasion for good advertising, and everywhere prominent manufacturers of mining machinery are preparing special exhibits.

Some of those have already been noticed. One of marked value is herewith illustrated. It is an exact model of a 5-stamp gold mill built on a one-tenth scale by the Union Iron Works of San Francisco, Cal. It is complete throughout, and works as readily and thoroughly as any first-class 5-stamp mill, of which it is a miniature copy. It has its ore crusher, grizzly, stamps, plates, concentrator for sulphurets, electric motor to furnish power, etc., complete, and when set up at the French capital, and given its regular supply of gold ore, will work steadily, showing the entire mode of operation, and will, doubtless, be constantly surrounded by groups of curious visitors, interested to see how the dull-looking lumps of rock have the yellow gold extracted therefrom, and how cleverly the little model does the work. The miniature mill depicted herewith cost about $3000; the background is of "staff," a plaster mixture, designed to represent the side of the canyon in which the mill is supposed to be. To show its diminutiveness, the figure of a man is purposely introduced. Were that portion of the picture omitted, there would be no way to judge of the relative size of the machine, and the picture would look like that of a usual-sized 5-stamp mill; but, upon comparing it with the figure of Mr. W. G. Dodd, the superintendent of the mining department of the Union Iron Works, it will readily be noted how small the model is, though perfect in every working detail. The accompanying picture is copyrighted by the Union Iron Works, San Francisco, Cal.



Model—One-Tenth Size—of Five-Stamp Mill, Sent by Union Iron Works, San Francisco, to Paris Exposition.*

The Mines of Salt Spring Valley, Cal.

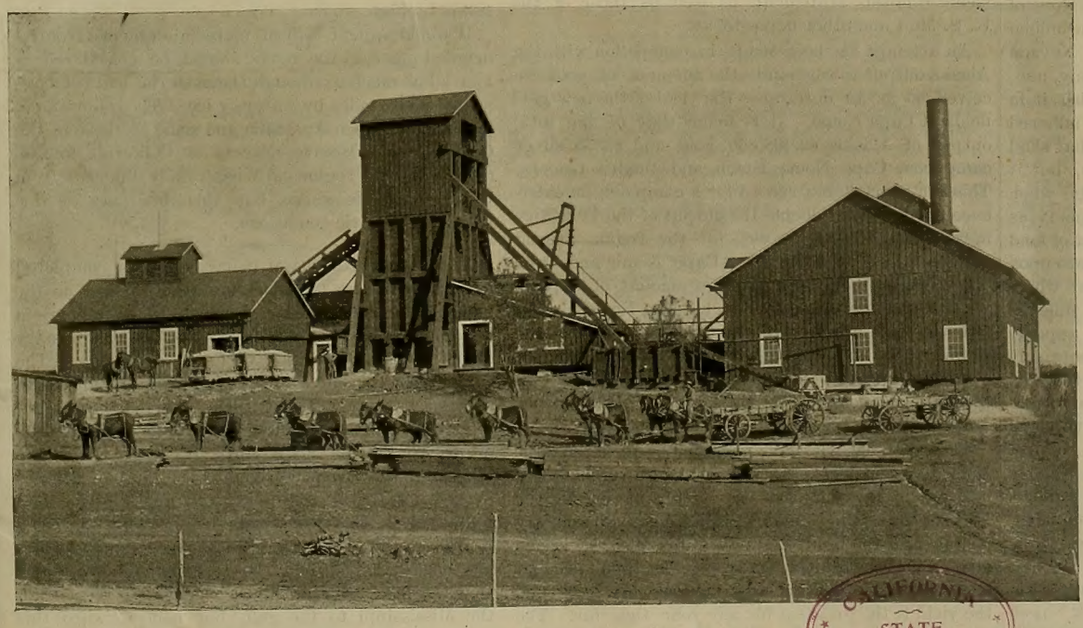
Between Bear mountain and Gopher Ridge, in Calaveras county, Cal., lies Salt Spring valley. Through this trough-like depression extends a gold belt reaching a distance of fifteen miles from the vicinity of Copperopolis northwestward to Valley Spring. Bear mountain and Gopher Ridge are composed largely of diabase of various types, from a crystalline granular, dark green rock to one of light color and aphanitic texture.

The dyke rocks are fine grained, light colored and of greatly varying size.

The gold-bearing quartz of the district is associated with these dykes, usually constituting a portion of the dyke.

The Royal consolidated mines at Hodson are at present the most extensively developed property in the valley. The accompanying illustration is that of the hoist building and head frame at that mine.

An electric plant is about to be installed at La Grange for the purpose of furnishing power to the Royal mines and incidentally to others of that vicinity, and a 120-stamp mill is also in contemplation at this mine.



The Royal Consolidated Mines, Salt Spring Valley, Calaveras County, Cal.

*Cut copyrighted by the Union Iron Works, S. F.

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San Francisco, January 6, 1900.

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AN interminable litigation appears to be in progress over mining property at Butte, Mont. The complex geological conditions due to faulting and displacement, which has occurred since the ore deposits were formed, and the American apex law are responsible for most of the trouble, which is accentuated by the large financial interests at stake.

THROUGHOUT the mining regions of the United States statistical compilations show that the year 1899 was an increasingly prosperous one, and the outlook for a greater success during 1900 is more promising than at the opening of the year 1899. The spontaneous attack from all sides upon wildcat propositions has had the effect of decreasing the number of that class of enterprises and has placed many upon a higher plane.

WHEN a prospector finds a very rich lead, he usually at once becomes fearful, will allow no one to develop it and does little himself, but fixes a big price on his prospect and waits for some one to buy what he is afraid himself to demonstrate by actual work. It is rarely that those possessing capital are willing to take so greatly exaggerated a chance, even on a rich specimen mine, for it is a well known fact, as proven by experience, that "specimen" mines in general are very irregular producers, and they have deluded more people into unprofitable investments, perhaps, than any other kind of mining property.

WE are indebted to the courtesy of Judge Ross of the Federal Court at Los Angeles, Cal., for the official text of his recent decision in the case of the Nevada Sierra Oil Company vs. the Home Oil Company, and, as usual in such important decisions, publish it in full. The Court, in deciding this case, has adhered strictly to the letter of the law in defining what shall constitute a valid discovery and relocation, but it places the prospector at a great disadvantage when the "indications" are such on adjoining property as to determine to a certainty that a given tract of land is mineral bearing, though no mineral appears upon the surface. Geological conditions may exist which will determine a certain tract of land to be mineral bearing, though no surface indications may appear. This decision, though relating to oil lands, affects any mineral deposit which does not outcrop on the surface, such as the ancient river channels of California, which course for miles hundreds of feet beneath a lava cap. Many of the mines of Leadville, Colo., and of Lawrence county, South Dakota, are of similar character in this respect. The subject is an important one, and, in view of the rapidly growing oil industry of California and other Western States, it is necessary that congressional action be taken to simplify the existing uncertainty as to the rights of the prospector, to whom the mining industry owes much of its existence. At the convention of the California Miners' Association, held in October last in San Francisco, Cal., a resolution was presented having a bearing upon this important matter, but which, unfortunately, was voted down without discussion.

Some Coast Gold Yields in 1899.

While it is yet too soon to expect a complete account of the value and distribution of bullion product for 1899, Frank A. Leach, Superintendent, and Chas. G. Yale, Statistician, of the U. S. Mint in San Francisco, have prepared a preliminary statement, based on receipts at the U. S. Mint and other bullion depositories on this coast. This shows that California produced in 1899 gold to the amount of $15,000,000, and silver $636,000. During the summer of 1899 numbers of quartz mills throughout the mountain counties of California were closed down for some months through lack of water. There were more of them closed than in the summer of 1898, as the second year of drouth found many of the reservoirs of the ditch companies entirely empty in the latter part of the summer. The gravel mines, as well as those of quartz, were seriously incommoded, the river-bed miners alone being benefited by the low stage of water. In Kern and other southern counties, however, no dependence is placed on water power for mills, all being equipped with steam power plants, and there has been an increase of gold product in that direction. A number of new mining enterprises have been started, and these, with the increase from the South, have evidently more than made up for the deficiency caused by the lack of water in the older mining regions. Several gold-dredging outfits have been profitably working during the past year, and more are being built. These have added their share to the increased product. The figures quoted should be of great encouragement to the mining community, since they show that the California gold mines are more than "holding their own," even under the most adverse climatic disadvantages. If they can show an increase of product of three-quarters of a million during an extended period of drouth, there should be an increase of two or three millions for the coming year now that an abundant supply of water is assured for all kinds of mining. Meantime advantage has been taken of the low stage of water to repair, enlarge and extend ditches, and repair and strengthen reservoirs all throughout the mining regions, all of which will have influence on an increased supply of water for mines in 1900.

Messrs. Leach and Yale have also prepared a corresponding estimate of the output of Alaska mines during 1899, which shows that the Territory has doubled its gold product over the previous year. The record for 1899 is gold $4,917,821 and silver $82,680, as compared with an output of gold of $2,517,121 and of silver $49,152 in 1898. This shows an increase for the year of $2,400,700 in gold and $33,728 silver, or a total of $2,434,428. It should be stated that the returns at the U. S. Assay Office at Seattle are included in this statement, as well as those of the U. S. Mint and other depositories.

An attempt has been made in connection with the Alaska output to segregate the amounts of gold received so as to determine the yield of the new gold fields at Cape Nome. It is found that of the total output of Alaska $2,408,830 gold and $3935 silver came from Cape Nome beach and tundra placers. This is a remarkable record for a camp only in existence one year—to double the output of the Territory in that time. It argues well for the region around Norton sound, Golovin bay, Cape Nome and Cape York, where there is yet a large amount of unprospected and unworked territory. The Nome placers have in 1899 apparently practically equaled in gold produced the combined output of the quartz mines of southeastern Alaska and Unga island and of the placers of Manook, Circle City, Forty Mile and other Yukon river districts.

Those persons who have imagined because the Cape Nome excitement has for the present overshadowed interest in Dawson, that the latter camp, on the British side of the boundary, is not doing so well, are mistaken, if the figures supplied by Messrs. Leach and Yale of the Mint are correct. The gold product of the Klondike shows a large increase for 1899, and the yield is the greatest for any year thus far. The gold output for the year is $16,110,129 and the silver $114,617. In the year 1898 the gold yield was $11,038,478 and silver $80,498, so an increase of Klondike gold is shown of $5,071,651 and of silver $34,119, the total increase being $5,105,770. The Klondike annual gold yield thus for the first time eclipses that of California, by about a million dollars.

Of course it has been impossible to make any estimate of the amount of gold mined either in Alaska or the Klondike, which has been retained at the mines. Only those amounts which have been received at the mints, Government assay offices, refineries and other depositories of bullion, have been considered in these estimates. The amounts retained to come out next season will be counted on next year's output when received at the mints, etc. The banks, commercial, trading and transportation companies, which do a large business in Alaska and Northwest Territory finally deposit their gold at the assay offices, refineries and mints, so these amounts are accounted for in their statements.

In 1898, out of a total gold product of $11,038,478 from the Klondike $414,295 was taken to Eastern mints and assay offices and not deposited on this coast. A proportionate amount has doubtless been taken East this year, which may be added to the estimates given. When all the statements of mints, refineries, assay offices, etc., are received from all over the United States, the figures of output of the year will no doubt be somewhat larger than those given.

What is Alluvial?

The miners of Western Australia, in Kalgoorlie district, are litigating over the meaning of the word "alluvial," as applied to mining. In the suit now pending the vein, or reef as it is called there, has been disintegrated and the debris of reef and wall rocks spread over the top of a low ridge and the vein itself is buried in the detritus; and as no croppings are visible, the exact location of the vein is not known. As the owners of the vein in adjacent territory were not working the ground covered by the detritus of the reef, it was located by placer miners as alluvial ground. The reef owners objected on the ground that it was not alluvial, that it was simply a fragmentary mass of material broken down by disintegration of the reef, but not washed, and that it was practically in place and therefore was, in fact, reef matter and not alluvial, and consequently not subject to location as placer. The placer miners claimed that all fragmentary material resulting from the disintegration of a vein was essentially alluvial, and, when enjoined by the court from working the ground in dispute, disregarded the injunction and were arrested.

The debris covering the low ridges of Western Australia is often from 3 to 15 feet in depth and often contains large quantities of gold. The disintegration has been effected by a wide range of temperature and infrequent heavy rains, resembling cloudbursts when they do occur. These agencies are materially assisted by high winds.

It would appear that all material detached from its original place in the rocks should be considered as alluvial as much as though the material had been removed many miles by water or ice. The alluvial deposits of Western Australia and some of those in the Colorado and Mojave deserts of California and in other very dry regions are essentially different from those found elsewhere, but this difference is due wholly to climatic conditions.

THE Chicago drainage canal has been completed and is in use, the gates having been opened on the morning of the 2nd inst. It has been seven years in building and has cost nearly $33,000,000. Its primary object is the disposition of Chicago sewage. The canal from an engineering standpoint is not only a success, but a novelty, as it has diverted the waters of Lake Michigan, which flow through it, from their natural outlet to the Atlantic ocean by way of the lakes and St. Lawrence river to the Gulf of Mexico by way of the Mississippi river and intermediate tributaries. The work was begun Sept. 3, 1892. For years the greater part of the sewage of Chicago has been pumped into the Desplaines valley, down which it flowed to the Illinois river, and thence via the Mississippi to the gulf, but henceforward this sewage will pass through the canal, being diluted by a large volume of water from Lake Michigan.

Concentrates.

THE British Klondike yielded more gold than California in 1899.

A HIGH speed in hoisting cannot be safely attained in inclined shafts without the use of guides, as skips are likely to jump the track.

TUNNELS run to develop mines should always, when possible, be run on the vein; only a great advantage in gaining depth should give preference to a crosscut tunnel.

THERE is no positive or satisfactory way of determining whether an ore is amenable to cyanide treatment without making a complete series of experimental tests.

TO OBTAIN the extralateral right—that is to follow the vein downward on its dip beyond the side lines of a claim located since May 10, 1872—the end lines of the claim must be parallel.

AN adverse claim must be filed with the register and receiver of the land office where the application for patent was filed, or with the register and receiver of the land office in which the land is situated at the time of filing the adverse claim.

THE Civil Code of California defines hydraulic mining as follows: "Hydraulic mining within the meaning of this title is mining by means of the application of water under pressure through a nozzle against a natural bank." The process was invented in 1852.

A STEAM-PIPE and water-pipe cement that will set under water is made of 2 pounds ground Paris white, 5 pound ground litharge, ½ pound fine yellow ochre, ½ ounce hemp cut up small. Mix well with linseed oil to the consistence of putty and use immediately.

SECTION 6 of the California State mining law of March, 1897, provided that all locations of quartz or placer formations or deposits, hereafter made, which do not conform to the requirements of this act, in so far as the same are respectively applicable thereto, shall be void.

THE watt is the unit by which electrical energy is measured. It is equal to the current of one ampere flowing at a pressure of one volt, i. e., a current of ten amperes with a pressure of 100 volts represents 1000 watts. A horse power is understood to be the equivalent of 746 watts.

LIQUID chlorine has been given practical test in chlorination works in California and elsewhere, but preference is yet shown the bleaching powder (used exclusively in barrel chlorination), not through conservatism, but because the latter seems to give the greater degree of satisfaction.

AN oil-soaked leather belt should have fuller's earth sifted on it, and after a short time scrape off with a sharp-edged piece of wood. Oil is injurious to rubber belts, but if a rubber belt slips on account of dust or dryness a very little boiled linseed oil applied on the pulley side of the belt will help.

TO ATTAIN the highest success in cyaniding ores the operator must be a proficient chemist and assayer or must employ others possessing these qualifications. Without knowledge of the chemistry of the process and methodical sampling the results may be satisfactory but it is "guess work" at best.

MORE attention is being given the concentration of ores at the present time than ever before, and as the necessity for this method of treatment becomes more generally understood the practise is likely to increase. Its employment affords a means of successfully working some mines that by any other method could only be worked at a loss.

THE assay ton is 29,166 grammes. It is obtained by dividing 14,000,000 (the number of Troy grains in one short ton avoirdupois) by 480 (the number of grains in 1 ounce Troy), so that 2000 pounds is to 1 A. T. as 1 ounce Troy is to 1 milligramme. If 1 A. T. of ore assays 1 milligramme of gold the ton contains 1 ounce Troy.

ON a mining claim located any time during 1899 the locator has until Dec. 31, 1900, to do the requisite $100 assessment work, and in California until Feb. 1, 1901, to make necessary record thereof. In California proof of labor for assessment purposes on mining claims done during 1899 should be filed with the County Recorder prior to Feb. 1, 1900.

TO CONVERT Fahrenheit thermometer degrees into degrees of Centigrade, subtract 32, multiply the remainder by 5 and divide the product by 9. Centigrade is the scientific thermometer. Fahrenheit is used—just for the same reason that two buttons are sewed on the under side of a coat sleeve at the wrist—a strange survival of an old custom.

LARGE amounts of water have been economically and speedily handled by the use of large bailing tanks arranged in tandem. This method has been particularly successful in mines worked through shafts having a low angle of inclination. The skips upon arrival at the surface dump automatically. From 1500 to 2500 gallons per trip can be removed in this manner.

ANY individual has the same right to locate a mining claim at Cape Nome as at any other place in the United States. The same general mining law applies there as it does in every other State or Territory in the Union. No leases of the beaches have or can be made. Anybody can mine on the beaches where no claim is ahead of him, but no claims can be legally staked out on the beaches, as the slopes below high water mark are held in trust by the Government for the future State. In the meantime, they may be mined by the first men to get onto them, who will hold their ground solely by actual possession.

WHERE A locates a claim in June, '99, and fails to erect monuments or posts at the corners, as required by the Federal statutes, his is not a valid location, and B, coming later, may locate a claim including a whole or part of the ground originally claimed by A; and in the event of contest A could not establish his right to the claim.

WHERE a shaft is inclined at an angle of 80° to 85° from the horizon and skips are employed, the skip should be provided with wheels which run on a track as in inclines of less inclination, and it should also have guides, as there is not only danger of overturning the skip in the shaft, but a greater danger of its leaving the track. In fact, it would be hazardous to run without guides.

WORK done upon a newly made mining location, prior to the first day of January next succeeding the date of such location, will not be credited to the annual assessment of $100 required by the Federal statutes, which specify that the period within which the work required to be done annually on all unpatented mineral claims shall commence on the first day of January succeeding the date of location of such claim.

WHILE no well equipped establishment objects to giving estimates or making bids on a large contract for mining machinery, yet it is not always possible to get the whole plant from one concern. Where the party inviting bids can make manifest intent and ability to order and pay for the stated requirements, and can be trusted to treat the figures furnished as confidential, there need be no insuperable difficulty in getting competitive bids on "a big job."

LONG tunnels to develop mining property are only advisable when the surface workings of the vein appear to justify such expensive development. The owner of a claim is rarely justified in driving a long crosscut tunnel before considerable development has been accomplished from the surface. Many tunnels run upon insufficient surface development have failed to find the vein at all in depth; or, if found, it is often disappointing in character and value.

IN treating ore or concentrates the best practise is the practise that pays best, and when more money can be made by getting 85 per cent of the assay value than by more elaborate and costly processes resulting in securing 94 per cent the former is certainly more satisfactory from a financial point of view. The practically scientific spirit is to work toward the end that the 94 per cent may ultimately be secured at the same cost that the 85 per cent is now realized.

THERE is nothing in the Federal mining law which prevents any locator or any set of locators from appropriating as many locations on the same lode as they may be able to find independent discoveries upon which to base them, but no location may exceed the statutory limit as to length and width. No one location of placer ground for one person shall exceed twenty acres, and no association shall take more than 160 acres in a single claim, but as many separate claims may be taken as the locators desire.

WHERE the workings of two mines are adjacent, but not connected, and the workings of one, being lower than the other, naturally drains the higher mine, it is the good fortune of the latter, and the owner of the higher property can not be held responsible; but the owner of a mine can not, when workings are connected, divert the natural flow of water from his mine into that of his neighbor by means of dams, bulkheads or other artificial devices. The laws of gravity only must influence the flow of mine waters.

UNITED STATES MINTS coined during the last fiscal year 18,254,707 silver dollars. The silver cost the Government an average of 90 cents an ounce. The aggregate number of silver dollars coined since 1878 is 482,622,376, and the dollars to be coined from the bullion remaining in the treasury will raise this total to nearly 600,000,000. This coinage will stop with exhaustion of the bullion now in the treasury, for there is no authority of law at present for purchase of any silver except such as may be necessary for small coinage.

CONCISELY, it may be considered that the force that has produced the mountain ranges on the earth is that of attraction exerted by the earth's kernel on its shell. The argument is: The central mass of the earth is in a highly heated state, and as it gradually loses heat by radiation, the kernel shrinks, thus attracting, breaking and crumpling its shell, and throwing up by these means the elevations called mountains. This is further considered manifest by observing the persistency and continuity of the lines along which this crushing force has acted. It is, of course, to be noted that in its processes Nature takes no note of what we call "Time."

RIVETS are described by the diameter and length in even eighths of an inch. The length of a rivet is determined by adding together the grip of the rivet, that is, the thickness of the plates or parts through which the rivet is to be driven, the length of metal required to form one head, and $\frac{3}{4}$ of an inch for each joint between the plates to allow for uneven surfaces which prevent closer contact. The length thus found may be increased by about 9% to allow for filling the rivet hole, which is usually $\frac{1}{16}$ inch larger than the rivet; thus the length of rivet required to join three half-inch plates would be $2\frac{7}{8}$ inches. For countersunk work add one-half of the diameter of the rivet for the head. The height of the head of a snap rivet should be about two-thirds of the diameter of the shank, and the diameter of the head should be from one and one-half to twice that of the shank.

ROASTING telluride ores presents peculiar difficulties, as it is a volatile metal, and is liable to carry off both gold and silver. The tellurides of gold and silver melt at a low temperature, and volatilize at a temperature only a little above their melting point. If the temperature be high during the first stages, globules of gold will be formed, and this coarse gold may escape attack in the subsequent cyanide or chlorination treatment. The particles of gold are liable to be enveloped in, or coated with, a film of oxide of tellurium, which, during the last stages of the operation, requires a high temperature for its removal. Hence, telluride ores must be subjected to a very gradual roast, low temperature during the first stages, with a gradual increase to nearly a white heat during the latter part of the last stage. With such indicated precaution the loss of gold or silver in roasting is reduced to the lowest minimum.

A REGULATION of the Mojave, Cal., mining district provides that within ninety days after date of location a shaft shall be sunk or tunnel run to a depth of not less than 10 feet from the apex of the vein. Failure to perform the designated work within the time specified subjects the claim to relocation. This provision of the district law was contested in the courts, and the decision of the Circuit Court of Appeals for the Southern District of California, recently rendered, sustains the local regulation, and says a mining district or a State may make regulations and enforce them. The Court considers that the $100 required by the United States as the minimum amount, and that local districts and States have the power to make such reasonable regulations as they may deem advisable, and that such work is in excess of the United States requirements and not to be considered as a part of the assessment work required by the Federal statutes. The right of a State to make such legislation has been universally recognized.

AS to the cheapest fuel for engines, at a recent meeting of mechanical engineers the report of a committee appointed to investigate the subject was read. These figures were given on an engine of about 50 H. P. capacity. Natural gas (engine), 12½ cubic feet consumed per horse power per hour, or 37,500 cubic feet for one year of 300 days, at 22½ cents per 1,000 cubic feet, or $7.43 cost per horse power per year. Illuminating gas (engine), 18 cubic feet consumed per horse power per hour, or 54,000 cubic feet consumed in 300 days at $1 per 1,000 cubic feet, or $54 cost per horse power per year. Gasoline (engine), ⅛-gallon consumed per horse power per hour, or 375 gallons consumed in 300 days, at 7 cents per gallon, or $26.25 cost per horse power per year. Coal, four pounds consumed per horse power per hour, or 14,400 pounds consumed in 300 days, or 7⅕ net tons, figuring at $4 a ton, this would indicate $28.80 cost per horse power per year. As to coal, a day was considered 12 hours, with gas and gasoline the figures are based on a day of 10 hours.

WHERE a number of miners hold a group of claims singly they may unite in the performance of the annual assessment where the work so performed is for the benefit of all the claims, as the running of a tunnel. In such work or improvement for the benefit of the several claims $100 worth of work or improvement must be made for each claim of the group. The several claims must be contiguous. In this regard the United States Supreme Court said: "It often happens that, for the development of a mine upon which several claims have been located, expenditures are required exceeding the value of a single claim, and yet without such expenditures the claim could not be successfully worked. In such cases it has always been the practise of the owners of the different locations to combine and work them as one general claim; and expenditures which may be necessary for all the claims may then be made on one claim. In other words, the law permits a general system to be adopted for adjoining claims, held in common, and in such case the expenditures required may be made or the labor performed upon any one of them."—Jackson vs. Roby, 109 U. S., 440.

GEORGE D. SHAW of Chicago is the fortunate possessor of the latest wonder in a mining appliance which will "revolutionize" the present system. By the use of Mr. S's apparatus it will be wholly unnecessary to do any prospecting or even preliminary development work. To California drift miners it will be particularly valuable, enabling them to dispense with expensive tunneling under the lava cap. This, of course, on the presumption that Mr. S. is stating the truth. He writes that he has an instrument that will "detect the presence of ore," and approximately indicate "the depth necessary to sink to reach it," and "the exact point to sink to catch the ore where it approaches nearest the surface." He doesn't even have to note outcroppings—just "catches" the ore as it unwarily approaches the surface. He begs us to "just think of the aimless digging done every year which can be avoided by its use." He states that "the world as yet is not apprised of its great value." He will sell a United States patent for $25,000—that is, all this nation—except California. That fortunate State he reserves for himself, so that it would seem useless for any one to attempt negotiations with Mr. S. for that State. It seems that Chicago millionaires are aware of the existence of this device and are liable any day to buy the exclusive right, so that any one who wants it should "snap it up at once."

The Cripple Creek Gold Fields.

NUMBER IV.—CONCLUDED.

Written by T. A. RICKARD, State Geologist of Colorado.

The mines of Cripple Creek have paid their own way from grass roots—that is to say, they have not grown up by the expenditure of working capital in development. Working muscle has made a 10-foot hole into a productive mine. There is, therefore, an instant contrast between the financial features of the industry when compared with the gold fields of the Transvaal or West Australia.

It may be objected that all mines are first made by the pick of the miner and are then enlarged into important enterprises by the investment of capital in machinery and development. Nevertheless the contrast above suggested is not a strained one, because it is a fact that the mines of Kalgoorlie and Johannesburg were merely tracts of land when they became the basis for large company flotations. The shafts were sunk afterwards by the companies organized in London, or elsewhere, and the ore was uncovered by workings which had no existence at the time of the first organization of the enterprise. Companies were brought out with a large subscribed capital, a portion of which was paid out in the purchase of the property and another portion was set aside as a working capital. It is rarely the case that a mine floated on the London market is able to pay the increased dividends necessitated by an increased capitalization without some preliminary development such as will permit of an enlarged output without exhausting the ore reserves. In the case of the deep level mines of the Rand the working capital is a princely sum, sufficient to sink a shaft a couple of thousand feet, or more, and erect a mill of 200 or 300 stamps. The finances of South African mining are a study apart and the result of conditions previously unknown in gold mining, although paralleled in the coal industry. It represents a development of modern practise, such as renders the digging for gold a steady business.

Even in districts which have not the extensive low-grade deposits of the Rand it is necessary to provide for a rainy day, and English capitalists are accustomed to the idea of furnishing a certain amount of money as a reserve fund to tide over the lean places in a mine's development The English practise of heavy capitalization has been censured often enough, but there is this to be said of the methods of London investors, that by subscribing an adequate working capital they often permit the mine manager to enlarge the capabilities of a property so as to enable it to hold up under its increased load and continue exploratory work during those intervals when the production does not meet the operating expenses.

The history of Cripple Creek records comparatively few abandonments, because the veins have proved so generally productive that their yield has sufficed to keep the work of development going, even if it did not meet all the expenses. As soon as a small mine becomes organized into a company it is listed on the stock exchanges of Denver and Colorado Springs as a "prospect," and when it becomes a regular producer it is promoted to the society of "mines," the two classes being kept distinct on the call lists of the exchanges.

A mine which does not pay goes through eras of greater or less activity, according as the owners of it can scrape together the money needed to continue the work. Idleness is possible because the mining regulations do not entail forfeiture on that account. The claim can be "patented." Labor conditions such as obtain in the English colonies are unknown in Colorado, and the continuous operation of a mine cannot therefore be enforced under the mining laws.

The leasing system is an important factor in Cripple Creek mining. Three or four years ago it was more prevalent. The owners of claims who were too poor to develop them or too timid, cut them up into several sub-divisions and leased them. The lessees might be working miners, who engaged the service of others under them, or the mine might be leased to outside parties, who hired workmen in the ordinary way. The period of the leases varied from six months to two years, and the royalties were 15% to 20% of the net returns—that is, the receipts from the mill or smelter after the costs of transport and treatment are deducted. The system served a good purpose, and many rich mines owe their beginning to the enterprise of a lessee.

The infrequent transfer of mines which has characterized Cripple Creek up to the present is due to the fact that the conditions for successful mining are esent to an unusual degree. In the first place, no o sinking was needed to reach the ore. Although ops were rare, and discovery was thus delayed, became evident that the tops of the ore-bearis could be reached by trenching. Ore was red at depths of from 10 to 30 feet. It was ipple Creek has always been a high-grade average yield for several years exceeded s per ton, and last year, notwithstanding for increase in the low-grade milling ore, it was fully two ounces. Therefore, even in the earliest period of development, the ore could meet the costs of transport to the smelters. But competing lines of railroad were soon pushed into the district, and facilities for cheap mining were obtained long before the gold field had reached a quarter of its present importance. This fact permitted poor men to work the mines, because it gave them a market for their ores. Muscle and energy were sufficient; capital was not needed to the extent known in less favored localities. Even to this day no single mine has a reduction plant of its own; it is not needed. As the camp grew the chlorination and cyanide mills erected in or near the district began to compete with the smelters, and prevented the latter from levying excessive rates of treatment; and, lastly, the demoralization of the silver market which occurred at the time of the closing of the Indian mints in 1893, and put a check on what was then the chief industry of Colorado, did at the same time aid Cripple Creek by diverting the energies of a very resourceful population to the development of the mines of its newly discovered gold field.

STATISTICS.—From the first beginnings in 1859 to the close of 1898 Colorado has produced:

Gold.....	9,512,242 ounces	$196,618,054
Silver.....	362,526,541 ounces	326,482,532
Lead.....	1,064,762 tons	87,131,457
Copper....	43,089 tons	10,742,167

The production for 1898 is estimated to have been:

Gold.....	1,138,584 ounces	$23,534,531
Silver.....	23,502,601 ounces	13,690,265
Lead.....	56,708 tons	4,117,043
Copper.....	5,435 tons	1,304,504

At the present time the mineral production of the State, inclusive of coal and iron, has a value of $55,000,000 per annum.

There are 30,000 men employed in the mines of Colorado out of a total population of 520,000.

The smelting industry of Colorado has been an all-important factor in the growth of its mining districts. There are ten large smelting works in the State (at Denver, Pueblo, Leadville and Durango), and several smaller plants whose activity is intermittent. The value of the entire product of the smelters amounted in 1898 to $61,000,000. This included the product from ores which came from neighboring States and from British Columbia.

At the present time 3500 tons are smelted daily in Colorado. The annual tonnage consists of 900,000 tons of ore, 300,000 tons of iron flux and 185,000 tons of limestone, the balance of the lime needed being obtained in the form of ores which carry more of it than is required for their own treatment. Aspen provides the bulk of the latter material.

The charges for treatment depend upon the composition of the ore, particularly the ratio of iron to that of silica. On a neutral basis the charge has been $4.25 for oxidized ores and $7 per ton for sulphide ores. On highly silicious ores, containing 60% to 70% silica, the charge is $8 per ton flat. Nineteen dollars per ounce is paid for the gold in ores carrying up to two ounces per ton, and $19.50 per ounce for those which are richer. Ores carrying less than two ounces go to the mills and the richer stuff to the smelters.

The dividends declared by the mines of Cripple Creek during 1898 amounted to $2,596,144, but to this figure must be added the profit made by mines not owned by the public companies, and also that of the numerous leasing parties, bringing the total dividends to fully $3,000,000.

Some additional notes concerning a few of the big mines will not be out of place. The Independence is one of the pioneer mines of the district. It was pegged out by W. S. Stratton on the 4th of July, 1891, and remained under his sole ownership until May 1st, 1899, when he transferred it to an English company, incorporated under the name of Stratton's Independence, Limited. This mine has never yet been pushed to its full capacity for production. In 1895 eight men, while engaged in development work, broke ore which netted an average of $155,000 per month for seven months in succession. Of the total area covered by the property, not one-quarter has as yet been explored. Up to May 1st, 1899, the mine had produced 44,224 tons, having a gross value of $4,071,860 and yielding a profit of $2,574,164. During the first quarter of the new company there were produced 9222 tons, having an average gold content of 4.02 ounces and a total gross value of $708,106.

The Portland adjoins the Independence on the north. Of its entire acreage only a little over 8% has been as yet explored. During 1898 the total receipts were $1,890,641, while the expenditure was $881,833 and the resulting profit $1,008,808. Dividends to the amount of $570,000 were distributed and additional claims were acquired. The surplus carried forward was $668,000. The total production of this mine to the end of 1898 has been 109,591 tons, having a value of $6,427,523. The average per ton is $58.65.

The Isabella became famous early in 1899 on account of rich discoveries which permitted of a resumption of dividends. Three separate shipments of over fifty tons each averaged forty-five ounces of gold per ton. This ore was obtained 20 feet above the ninth level.

Next to the Isabella is the Victor mine, which is said to have been bought in 1893 for $52,000 by Messrs. Moffat & Smith, who still control its operations. The dividends paid since then have an aggregate value of twenty-two times the purchase price of six years ago. The profit earned in 1898 was $323,724. The total output to the end of that year has been 12,242 tons of smelting ore and 82,249 tons of milling ore, having a total value of $2,161,186.

Regarding other mines above mentioned, it remains but to add that most of them have made much larger profits than the dividends indicate, the want of reserve capital causing the expenditure of part of the profits for the acquisition of adjoining territory or the carrying forward of a surplus to be used as necessity arises.

FUTURE PROSPECTS.—In the eighth year of its existence Cripple Creek produced $13,500,000, of which 22% was distributed in the form of dividends.

The present boundaries of the productive portion of the district are approximately identical with the area occupied by the andesite breccia and the other rocks of the volcanic complex. This covers about ten square miles. It is undoubtedly the proper territory for further exploration, and no part of it offers greater promise than the line of contact separating the breccia from the granite. Nevertheless the geological conditions outside this circumscribed area are such as to forbid hasty conclusions discouraging to prospecting in the granite which surrounds the district on all sides.

The recent discoveries of pay ore in Grassy gulch and on Copper mountain are suggestive of the probable extension of the boundaries of the gold field. It is known that the phonolite dykes which are associated with the productive lodes of the central area extend into the outer granite. Indeed, several rich mines are wholly in the granite, at distances varying from a few hundred feet to over 2000 feet from the breccia. The Strong and Gold Coin are notable examples, while among those most distant from the main mass of the breccia may be mentioned the Orizaba and Prince Albert on Beacon mountain, and the Sweet and Caledonia, west of Anaconda. It must not be thought that these mines exhibit an ore occurrence wholly distinct from the main volcanic complex. Such an idea would be unwarranted, because, while they are situated far outside the mass of andesite breccia, the gold-bearing lodes which they develop are associated with phonolite, in dykes and masses. The geology of Beacon hill is especially characterized by a very large intrusion of that rock.

It is not extraordinary that the vicinity of the contact of the granite with the breccia should be a favorable environment for large bodies of ore. The contact must have been, at all times, first a line of weakness, next a line of movement and consequent fracturing, and finally a line of water circulation. Thus there existed the conditions which experience and observation indicate as being most favorable to mineralization, especially when to these is added the penetration, across the contact, of bodies of volcanic rock, such as the dykes of andesite, basalt and phonolite. Although comparatively little ore has been found lying immediately upon the contact, there is plenty of proof, in the Independence, Portland and Granite mines, for example, of the fact that the lodes crossing it have been beneficiated. Similarly the phonolite dykes, when they pass out into the granite, have afforded a line of weakness along which fracturing has subsequently occurred, forming shattered planes and lines of maximum porosity, permitting of the circulation of the underground solutions which precipitated the precious metal. Every added page of evidence only further confirms the view, held by the writer early in the infancy of the camp, that Cripple Creek corroborates to a striking degree the most modern explanations of ore deposition chiefly associated with the name of Posepny.

Will increasing depth be accompanied by impoverishment? This is not asked with the timidity of a few years ago, when the lodes had only been followed 200 or 300 feet in vertical descent, and it was foreseen that they would eventually cut into the granite under the breccia. At that time the future of the district was uncertain, and many cautious men held back in fear of unfavorable developments. It is obvious that the mines near the edge of the depression occupied by the breccia will penetrate into granite by sinking their shafts or by extending their levels. This has occurred in the case of the Independence and Portland mines, which reach the granite on the southern and western sides of the territory owned by them. If good ore is found in the granite at a horizontal distance of 2000 feet from the mass of breccia, why should it not also be found at a similar vertical distance below the same formation? All the evidence to hand goes to show that wherever the dykes have broken through the rocks of the volcanic complex they have permitted of ore deposition, and that therefore the possibilities of future discovery are not limited to the present restricted known productive area.

The steady betterment in economic conditions tends continually to decrease the working costs and to make a commensurate addition to the tonnage of ore available for exploitation. This is the story of all modern mining regions. The Rand illustrates it; Kalgoorlie accentuates it. There is no immediate probability of any radical change in methods of ore reduction or transport, but there is a tendency in several directions to diminish the expense of handling

low-grade ores. Two railroads tap the district, and the competition prevents rates of transport being unduly high. The building of a third line is probable, should the production of the camp increase as it promises. Electric haulage is likely to become a factor in reducing this item of expenditure. The increased capacity of the mills, due to their steady enlargement and the better arrangement of the machinery, is permitting them to buy ores which at one time were considered to have no commercial value. Five years ago the minimum rate for freight and treatment was $12 per ton, while to-day it is $7 per ton. During the same period the smelter rates of treatment have dropped from $15 to $6.50 per ton. What a reduction such as this means, and how great a tonnage of low-grade material it transfers from the category of rock to ore, will be appreciated by those who have watched the growth of other districts.

In the general persistence of the ore bodies, in the size and continuity of the lode channels, and in the economic conditions favoring an easy realization of the values contained in the ores, Cripple Creek exhibits the features of a great gold field, and affords the promise of a future which will eclipse the achievement of the first eight years of its existence.

Laccolites and Their Relation to Ore Deposits.

NUMBER II.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS.

Aside from their peculiar geological interest, laccolites possess an additional attraction in their close association with ore deposits at a number of important localities. The first place to attract attention to laccolitic structure in connection with ore deposits was at Leadville, Colo., where the intercalated sheets of white and gray porphyry were recognized by S. F. Emmons as due to laccolitic uplift and intrusion, and Mr. Emmons also considered that these eruptive rocks had a direct and important relation to the ore deposits, concerning which he says:* "The dynamic movements which resulted in the elevation of the Mosquito range and produced its present complicated structure can be most readily explained on the generally received contraction theory, as the result of tangential pressure exerted upon the upper part of the earth's crust. * * * * * In the region under consideration the pressure would act from the east westward.

"After the deposition of the sedimentary beds in this area, there occurred during Secondary times an intrusion of igneous or eruptive rocks, which spread themselves out in sheets between the strata and became, as it were, an integral part of the sedimentary formation. It was after the eruption and consolidation of these masses of igneous rock that the dynamic movements producing faults, folds, etc., occurred.

"In their mode of occurrence the type feature is that of intrusive masses, which are developed on a scale of unprecedented magnitude, and follow certain horizons with remarkable regularity. These interbedded sheets are found to have a maximum thickness at certain points or along certain lines, and to become thinner in proportion to their distance from such central point, which is probably near a vent or channel through which they were erupted. This form resembles the structure of the intrusive masses of the Henry mountains which have received from G. K. Gilbert the name of laccolites. Nor is the resemblance confined to external structure, but extends also to the internal texture and mineralogical composition. It is probable that this mode of occurrence of eruptive rocks, viz., as intrusive masses, which did not originally reach the surface, but were forced up to a certain horizon and then spread out between the beds, is far more common than has hitherto been suspected by geologists.

"It is difficult to conceive of the conditions under which a fused mass could pry open strata to a width of 1000 feet or more, overcoming the weight of 10,000 feet of superincumbent rocks, and spread itself out in a continuous sheet between the beds to a distance of ten miles from the point of line of eruption. That they did exist, however, can be clearly demonstrated in this region, thanks to the intense action of folding and faulting, and the enormous amount of erosion which has taken place since such eruption, and afforded exceptional opportunities for a study of their form and extent."

That there were several laccolitic uplifts in the Leadville region is evident, and the material from the several vents varies. There are no less than fifteen separate sheets extending over large areas, reaching from the Cambrian to the Jurassic and possibly higher.

Some of these beds may be traced for miles. They follow usually one plane in the sedimentary horizon, but instances are noted where they have abruptly changed, cutting across a bed and continuing at a higher or lower plane. Later sheets have also intersected older ones of different character of rock in Leadville district. It is only by an extended observation and study of the region that this structure becomes evident as the continuity of the strata, both sedimentary and eruptive, is frequently interrupted by faults which are planes of displacement, exceeding in one case 2000 to 5000 feet, as in the Mosquito fault. Those in the lower part of the district—from Breece Hill downward toward the town of Leadville—vary from a few feet to 1200 feet, the latter at the Iron fault, between Carbonate and Iron hills.

*Geology and Mining Industry of Leadville, U. S. G. S. Monograph, XII.

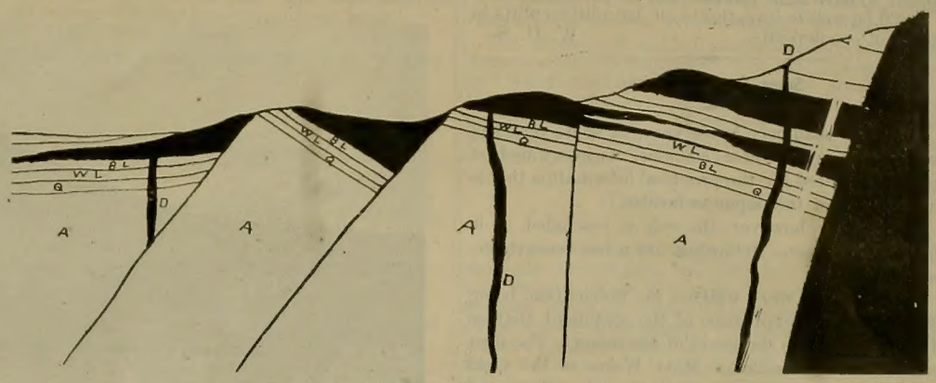


Fig. 4.—Section at Leadville, Colo., Showing Laccolite.

The accompanying sketch, Fig. 4, represents the occurrence of the laccolitic sheets in the Leadville district. The ore occurs at several horizons, but chiefly in the blue limestone marked B.L. The eruptive rocks, porphyries of various kinds, are represented by the black portions. The vertical irregular bands represent later intrusive dykes, and the inclined sharp lines show several faults, that at the center being the Iron fault above referred to. The main mass of the laccolite lies farther to the eastward than indicated in this sketch, but conveys the idea as well as a sketch drawn to scale.

Strangely, the intrusion of laccolitic sheets do not appear to metamorphose the sedimentary beds to any great extent. Occasionally quartzites or sandstones are found to have developed feldspathic crystals as a result of contact metamorphism. Concerning this in Leadville, Mr. Emmons says: "There is a notable absence in this region of strongly marked contact phenomena in the sedimentary beds—that is, changes which have resulted from the contact of a fused mass, such as a baking or vitrification. The changes which are found in them near intrusive masses are evidently rather the result of the action of percolating waters."

In regard to the genesis of the Leadville ore deposits, Mr. Emmons concluded that "they were derived from aqueous solutions; that these solutions came from above, and that they derived their metallic contents from the neighboring eruptive rocks."

As the overlying eruptive rocks are the laccolitic sheets, Mr. Emmons conceived that the ore deposits were derived directly from these rocks.

The geology of Leadville is not complex, excepting in a few local instances. Indeed, it is very simple, consisting of regularly bedded deposits of quartzites and limestones, conglomerates and grits, interbedded with sheets of intrusive igneous rock, the entire series lying non-conformably upon the Archæan granite and gneissoid rocks. These formations are folded, tilted and faulted, as previously described, and this, together with exposure by erosion, has rendered a complete study of the geology of the district possible. The laccolitic sheets were intruded prior to the folding and faulting, and it is not improbable that ore deposition occurred prior to these movements of displacement. The physical condition of the ore deposits themselves at and near fault planes and in the anticlinal domes or synclinal basins attest this.

Aspen mining district, in Pitkin county, Colo., is also an area of laccolitic intrusion, but the intrusive sheets are fewer in number than at Leadville, and they have only an indirect connection with the ore bodies. The geology of Aspen, though normally simple and not unlike that of Leadville, has been rendered most complex by a series of faults, thrusts and folds, in some cases often repeated in close proximity, rendering an understanding of the geology of the district very perplexing. The quartz-porphyry of Aspen is similar to the white porphyry of Leadville. Mr. Emmons, in speaking of the source of the Aspen porphyry, says:

"Beside the main sheet, there were found in several places in the vicinity of Aspen crosscutting dykes, vertical or nearly so, which may connect the bedded sheet with some concealed body of porphyry below. One of these localities is on Aspen mountain, at the Bonnybel mine; the others are on Smuggler mountain, at the Bushwhacker and Park-Regent mines and in the Smuggler. It is also shown in the Bonnybel mine that a few small sheets were sent out from the dyke, along the bedding, altering the dolomite to marble on their contact. Along the fissures represented by these dykes much molten material must have ascended. It has been shown by various geologists that the great sheets, and even the laccolitic bodies, of intrusive rocks, which are so common in the Rocky mountain region, have ascended along narrow fissures; and the whole body of porphyry at Aspen may well have come up through a few such dykes as have been observed."

From the above it will be seen that the ore bodies of both Leadville and Aspen have a close association with laccolitic intrusions, whether the genesis of the ore deposits be directly due to the laccolite or not.

In South Dakota, in the northern Black Hills, laccolites occur in numerous places, and in a number of instances these are found to be associated with ore bodies of commercial value.

As in Leadville, the rocks vary in character, though the geological structure is similar. The largest laccolite in the Black Hills is that having Terry peak as a nucleal core. This great mass of intrusive material has sent out several sheets into the Cambrian and Carboniferous formations which surround the peak on all sides; but, in addition to this great laccolite, there are numerous smaller ones. They are found along Squaw creek, in the Carbonate camp, on Two-Bit gulch, at Galena, to the northward of Deadwood and elsewhere. Some of these are of limited occurrence, and, though small, form typical laccolites. All of these do not appear to be associated with ore deposits, but the most of them are. The Potsdam ore bodies, which occur scattered over an area of more than sixty square miles, are almost invariably associated with laccolitic sheets.

While this is true, it has not been possible to trace the origin of these ore deposits directly to the laccolites, but there is much to indicate that the ore deposits have a direct relation to the intrusive dykes which are later than the laccolites, and are often found to have cut through the sedimentary beds and the laccolitic sheets as well.

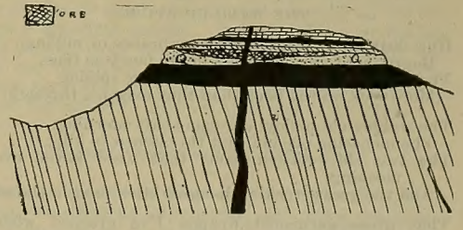


Fig. 5.—Ore Deposit Above Laccolite Sheet

This occurrence is illustrated in Fig. 5, which is a typical occurrence of an ore deposit of this region, associated with a laccolitic intrusion and also with a dyke. The latter cuts through the underlying pre-Cambrian crystalline rocks intersecting the large laccolitic sheet separating the Cambrian quartzite from the underlying slates and schists of the Algonkian. At a higher level is seen a second, though smaller, sheet of similar rock. The ore occurs in and upon the quartzite. In many cases the laccolitic sheets are found both immediately above and below the ore deposit and in contact with it.

While these sheets of intrusive rock are of widespread occurrence, that of the ore is local and is usually confined to the vicinity of the dykes. The ores occurring under these conditions are telluride gold ores and lead-iron silver ores. The erosion of this section has been so extensive that only small remnants of the original sedimentary formation usually remain, and superior opportunity is thus afforded for a study of the occurrence of the laccolites. Particularly is this the case in the Carbonate camp, on Squaw creek and on Two-Bit gulch. Six miles north of Deadwood a large intrusion of rhyolite has lifted the sedimentary beds of the Cambrian, tilting them in dome-like form, the rhyolite separating the sedimentary beds from the Algonkian, but the intrusive rock was not observed to have broken through the sediments. No ore has as yet been discovered there.

On the whole, while laccolites occur at numerous places in the Rocky mountain region, as stated by Mr. Emmons, they are likely to occur more commonly than has generally been supposed. They are found associated at a number of places with extensive ore deposition and to such an intimate extent as to have led to the belief at one time in Leadville that the metallic contents of the ores were derived directly from the

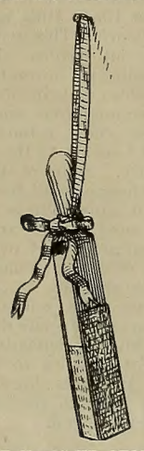
laccolitic sheets; but, as geologically similar ore deposits are found in Leadville and elsewhere not in contact with these laccolitic sheets, and as sufficient evidence has been found to associate the genesis of these ore deposits directly with the vertical dykes accompanying the ore bodies, it appears that laccolites are merely an incidental feature of the geology of these deposits and not essential to their creation. However, as ore deposition and laccolitic intrusions appear to have some relation, not as yet understood, it would be well to investigate all laccolitic uplifts in search of ore deposits. W. H. S.

Some Seemly Rhymes.

Not more than once in ten years or so do verses of poetry appear in these columns, as every inch of space is required for the practical information that is the province of the paper to furnish.

Occasionally, however, the rule is rescinded, as in the present case. Following are a few recently received.

None of them were written for publication, being extemporaneous expression of the sentiment that so often springs from the heart of the miner. The first was written by millman Matt Waite of the Gold Bank mine, Forbestown, Butte county, Cal., and accompanied a miniature "hang-up stick," about two inches long, festooned with ribbon, sent to his friend Harry Leavitt of San Francisco. The little "hang-up stick" and the verses are here reproduced:



THE HANG-UP STICK.

How dear to my heart my remembrance of milling,
Reproduced are the scenes in my fancy so true:
The leaky ore feeders that always were spilling
More rock on the floor than they ever fed through.

The wobbly old pulley, our cam-shaft adorning,
The menacing ore bin that threatened to kill;
The two old cracked cams that were keyed every morning,
And the grease-reeking hang-up stick used in the mill.

That grease-garnished weapon I've grasped with a feeling,
When often at noon from my luncheon I flew;
What a gift of profanity I was revealing,
As I hung up a stamp that had broken a shoe!

The greasy old "cam-post," the chain blocks hung near it,
The sledge and the drifts and the shims that don't fill;
And George's shrill whistle—a dead man could hear it—
As we rushed for the hang-up stick used in the mill.

But now far removed from that grease-smeared condition,
No tears of regret do my eyes ever fill;
Yet I hail as an old friend this pigmy edition
Of the grease-festooned hang-up stick used in the mill.

The next is written by L. Clare Davis of Stockton, Cal., kindly sent us by Mr. Ziegenfuss, editor Citizen, San Andreas, Cal.:

A MINER'S CANDLESTICK.

Oh, my old candlestick, you're my constant friend
Down under the ground where the shadows blend,
And a man's shut away from the good God's light,
From the blush of dawn to the hush of night;
Where a child's merry laugh, or a bird's low trill,
Never can fall like a light, rippling rill
To sing to the miner of cheer in his home
And ring in his heart like an old love tome.
A drill makes the music that rings in his ears,
But a candle's the charmer to drive away fears.
Down deep underground where grim shadows are thick—
Here's to you always, my old candlestick!

Aye, many's the time we have had here at night
When darkness was playing tag with the light,
Where the flecked clouds of quartz and the glint of gold
Spun themselves into dreams that cannot be told.
You're a weapon of war for the skulking foe—
My one friend that sticks, wherever I go.
Yes, grimy the hands are that swing the old pick,
But while there's yet life to our post we will stick.
The swing of the hammer, the ring of the drill,
Are dear to the soul of the miner still;
But mem'ries that stir me, and prove to the quick,
Are all twined about you, my old candlestick.

The following bit of homely philosophy is from Frank Aley of Globe, Arizona:

THE PROSPECTOR'S PHILOSOPHY.

"Has existence been a failure in yeour specific case?"
"Chuck" ask'd me with a shadder on his good old honest face,
And at first I had to answer, it seemed to me it had,
Though my history from childhood was not so very bad—
But say!

When I cum to think about it, it sorter seems to me,
There wuz two sides to the question, if there wuzn't two or three;
True, I hadn't any money, nur property, nur sich,
I wuzn't very hansum, nur popular, nur rich,
Nur nuthin'.

I never made a splutter in the Legislatur halls,
Whur Honorable Bill So-and-So, gits up and kicks and balls,
Whur a 25-cent statesman, with bizness in his eye,
Sells his honor fur a nibble uv administration pie,
O, no!

I never run fur office, I couldn't if I'd try,
The people wants a feller with a twinkle in his eye,
Who talks and smiles and wriggles, in his scientific play,
Then turns around and robs 'm in the good old fashioned way,
Yes, indeed.

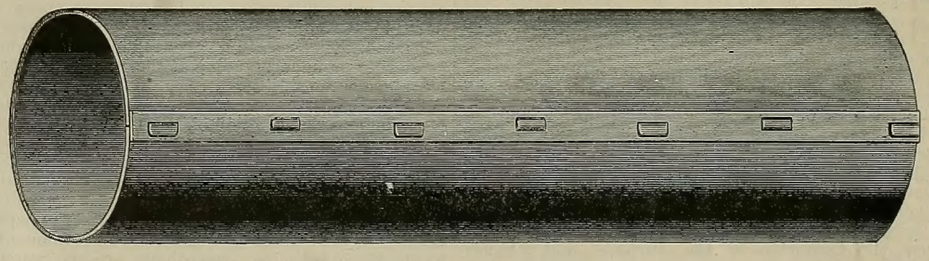
Cum to think, there's another defalcation in my case,
I can't look into the winder and behold a baby face,
And another jist behind it, full uv happiness and love,
Jist as though it wuz an engel, cummin' to 'm frum above,
Well, well!

Guess I won't discuss that subjec', sorter ten's to make me blue,
Sets the boys to askin' questions, "What the devil 's ailing you?"
Nothin' to 'm, yit I reckon, they all have their loads to tote,
And you'll find they're all a sailn' in the same old boat.
You bet.

But I've hit upon a system that never fails to fit,
When I can't git jist what I want I'll take what I can git,
And I'm not disposed to worry, while there's monarchs in their might
Who'd gladly give their riches fur half my appetite.

Clinched Sheet Steel Pipes.

A Chicago concern is making a clinched pipe, illustrated herewith, from steel up to No. 8 gauge, and from 3 to 16 inches size—a sheet steel pipe with invisible side joints, in lengths up to 10 feet.

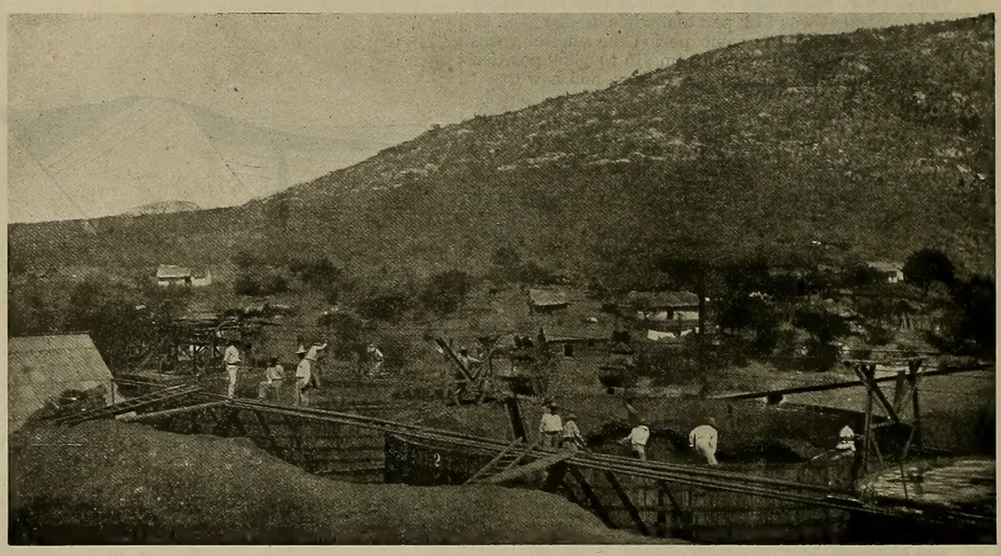


Clinched Sheet Steel Pipe.

THE Geographical Society of the Pacific, San Francisco, Cal., has official notice that it has been selected as a depository on the Pacific coast for all charts issued by the U. S. Geological Survey.

El Progresso Mines of Lower California.

Near Triunfo, Lower California, are the mines of El Progresso Mining Co. The original company was organized in 1862 for the purpose of developing these properties, but failed, as did also their successors. A concession was granted El Progresso Co. by the Mexican Government in 1897, and a large industry has been built up at these mines, said to be the oldest known silver mines in Lower California. The machinery installed at the mines is valued at $250,000, the plant including a 40-stamp mill, hoisting machinery, drills, air compressors, engines, etc., and a complete cyanide plant, an illustration of a portion of which appears herewith. A narrow-gauge railroad conveys ore from the mines to the mill, and employment is given to 1000 men the year round. The annual operating expenses are stated to be $650,000, Mexican. It constitutes one of the largest mining concerns in Lower California. All supplies for these mines pass through the port of La Paz.



Portion of Cyanide Plant at El Progresso, Lower California.

AT Aubervilliers, France, is a factory for the electrical seasoning of timber. The seasoning vats are in a line under traveling cranes, used to transport the timber. Their length is from 4½ to 13 yards; their width from 5 to 10 feet; the depth is constant, 5¼ feet. Each vat is supported on insulators. The platform in the vat on which the timber rests is directly supported on the plungers of hydraulic cylinders, by which the charge of timber can be readily lifted clear of the liquor. In this way the vat is recharged. The timbers are stacked in alternating longitudinal and transverse layers, the heavy upper electrodes then laid on the charge, lowered by the hydraulic cylinders until the electrolyte reaches the desired height around the wood. The heat required for the solution is obtained by means of steam coils. Monthly the organic materials escaping from the wood are removed from the bath by raising the solution to boiling point. The organic materials then rise to the top and are skimmed off. The nine vats provide for the simultaneous treatment of about 3200 cubic feet of timber.

IN a recent experiment made with superheated water, it is asserted an ordinary passenger coach on the New York Central Railroad was moved fifteen miles at an average speed of twenty-five miles an hour at an actual cost for power of 5 cents. The power is generated in an apparatus consisting of upright steel tubes joined together at the top and bottom, so as to permit of perfect freedom of expansion and contraction, thorough impingement of the heat applied and natural circulation of the water, the whole resembling an ordinary upright steam radiator. The water is heated to a temperature of 500°, or 150° more than the temperature of steam in a typical locomotive boiler. A tank carried on the vehicle or car can take

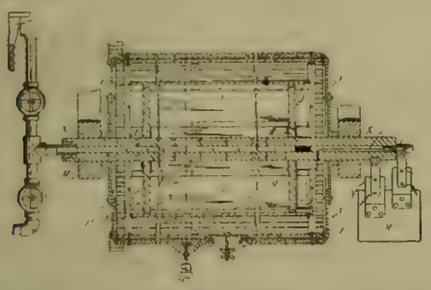
the water from the generator at the rate of 300 pounds a minute, and the loss of heat by radiation is avoided by the use of lagging. When released into the engine the water expands nearly 1000 times.—Electricity.

Latest Mining and Metallurgical Patents.

Patents Issued Dec. 26, 1899.

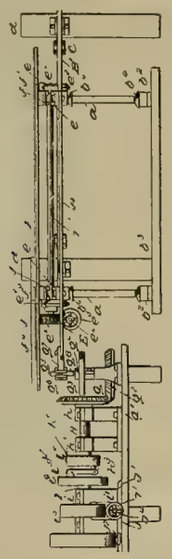
Specially Reported for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR EXTRACTING PRECIOUS METALS FROM ORES.—No. 639,766; L. E. Porter, Los Angeles, Cal.



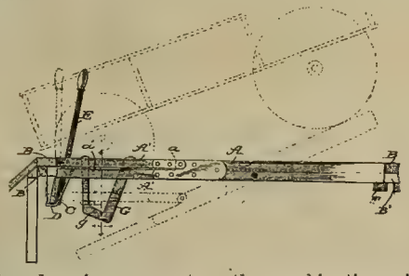
A machine for extracting precious metals from ores, comprising a rotating barrel adapted to contain the ores, chemicals for treating the same and also the evolved gases under a considerable pressure; barrel being provided with a valve opening having an external valve seat; a valve arranged to close such opening; a valve guide secured to the barrel and having a guide opening to receive the stem of the valve; a coiled spring encircling the valve stem and engaging with the valve guide to hold it against a given pressure of the evolved gases; a tension nut for regulating the tension of the spring; a pivoted lever having one end secured to the valve stem and having its other end arranged to be engaged by a trip arm; a trip arm arranged to engage the lever; and an adjustable tension for regulating the pressure of the trip arm; arms secured to spiders; supporting rings secured to the arms; frames secured to the rings; the carbon plates secured upon the frame; and a source of electrical energy having one pole connected with the barrel and the other pole connected with the carbon plates.

ORE CONCENTRATOR.—No. 639,920; H. H. Cramer, Aspen, Colo.



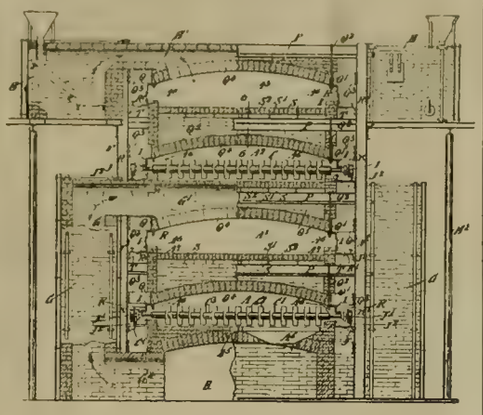
An ore concentrator, comprising a table, a support therefor having universal bearings, means for imparting a differential rotary movement to table, springs connected to support, and a longitudinally movable bar at one side of table and to which springs are also connected.

DUMPING APPARATUS.—No. 640,036; B. Sims, Paris, Illinois.



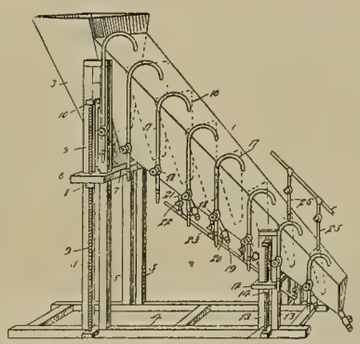
In a dumping apparatus, the combination with a frame having wheel stops, of rails pivoted in rear thereof, lever sections hinged to rails on the upper side, and provided near their front ends with lateral projections, hangers having inclines at their lower ends upon which lugs are adapted to strike and slide downward, and a tripping device, as shown and described, whereby rails and lever sections are adapted to assume a lower position and a greater or less angle to each other, according to the variation in diameter of the wheels of cars or wagons run upon the rails, so that practically the same inclination of the car or wagon bodies is obtained in all cases.

CALCINING FURNACE.—No. 640,058; A. H. Wethey, Butte, Mont.



A furnace structure comprising a series of superposed horizontal hearths and roof arches therefor, the same being separated by slots at the sides, two opposite rows of vertical posts arranged aloug the side walls of the hearths, longitudinal beams upon which the arches rest at the sides, means connecting the beams with the posts and supporting them upon and spacing them from the latter, rakes arranged on the hearths, and projecting through the side slots, carriages for carrying the ends of the rakes, rails for carriages, and supports for the rails upon which the latter are held in the lateral spaces intermediate the posts and the sides of the hearths. The furnace having two or more ovens with the roof of one oven and the floor of the one next above connected together, and provided along their sides with horizontally arranged metal beams, ovens having open slots at the sides, a series of vertical posts offset from the horizontal longitudinal beams, means for sustaining the roofs and floors, means being arranged between connected roofs and floors on one hand and the vertical posts on the other, and connected and supported upon the vertical posts, a rake extending through the oven, and having upon its ends truck wheels arranged between the horizontal longitudinal beams and posts, and rails or trackways exterior of the furnace walls and upon which the above-named wheels run. A calcining furnace comprising two opposite rows of vertical posts spaced away from its side walls, hearth and rail supports extending inwardly from the posts, rails arranged between the walls and posts, a plurality of superposed hearths or floors and roof arches located in different horizontal planes and having side and end walls provided with spaces which separate the hearths vertically from their arches, walls having continuous open slots traverse beams and stirrups partially supporting the arches and connecting the hearths with the posts, chains extending parallel to the side slots, and exterior of the furnace walls, pulleys on which chains run, and stirring devices secured to chains and having their ends extended transversely through the side slots, whereby the stirring devices may traverse and be carried from one hearth floor around its end to another.

ORE CONCENTRATOR.—No. 640,117; H. Earle, Canyon, Colo.



An ore concentrator, comprising an air-tight chute or casing substantially V shape in cross-section, a receiver for material at the upper end of chute or casing, and adapted to discharge material into chute or casing, means for supporting the chute or casing in an inclined position, vertically disposed partitions in the chute or casing, forming end walls of compartments, a siphon pipe leading from each compartment through the top of the chute or casing, valves in siphons, and valve-controlled discharge pipes leading through the bottom of the chute, the inlet ends of pipes being directed toward the upper end of the chute, water jet pipes arranged adjacent to the inlets of discharge pipes, and a pipe for supplying water to the chute or casing in its several compartments.

PROCESS OF AND APPARATUS FOR MAKING COPPERAS.—No. 640,026; A. S. Ramage, Cleveland, O.

The process of making commercial copperas from liquor containing sulphate of iron and free sulphuric acid which consists in neutralizing the free acid by the addition of a form of magnesia which will make magnesium sulphate with the free acid, but will not decompose the sulphate of iron, and evaporating the resultant liquid.

The Occurrence of Tin.

The tin deposits of Cornwall have been almost continuously worked since the earliest times. In the St. Just district, West Cornwall, the prevailing rock is granite, which is frequently traversed by elvans or dykes of quartz-porphyry. Overlying the granite in places a killas or indurated clay-slate is found. Sometimes the tin occurs in the slate; but more frequently it is found in the granite or quartz-porphyry in lodes and dykes. It is found that when the lodes are large they are highly productive, and when they become small they yield but little tin.

In the Botallack and Levant districts tin occurs in many instances in flat lodes or floors. In the Botallack mine a number of parallel floors, alternating with an ochreous ironstone nearly 60 feet thick were worked. This singular deposit was in slate country close to the granite. In the St. Ives Consols mine tin was found in large lenticular lodes termed carbonas, composed of a gangue of schorl (black tourmaline) and occurred in granite.

On Carn Brea a lode has been extensively worked. It was formed by a small quartz leader, seldom more than 2 inches wide, which occupied the space formed by the grinding away of the walls of a fault. A mass of schorl rock from 4 to 15 feet wide, and containing from 1 to 3 per cent of cassiterite distributed through it in fine grains, coarse crystals, or little strings, occurred, sometimes on one side, sometimes on both sides of the quartz leader. The schorl rock passed into the quartz and into the granite and slate walls without any perceptible break occurring.

It is interesting to know that there appears to be no impoverishment of the tin in the Cornish lodes at depth. The Dalcoath mine, which has been worked almost continuously since 1799, and in which the main shaft has now reached a depth of 3000 feet, produces ore at the present time almost as good as the ore when it was first opened. It is regularly producing 2000 tons of block tin per annum from 3 per cent ore, and the directors have such a high opinion of the mine's prospects that they have determined to equip it and the mill with modern American machinery.

Proposed Government for Nome Beach.

Cape Nome miners want some definite ruling as to mining locations at Cape Nome, and have petitioned Congress that all shore lands of Alaska and adjacent islands lying between the line of vegetation and 50 feet seaward of low water mark be exempted from ordinary placer locations under the general laws of the United States and be made subject to miners' license to be issued for the term of one year to persons entitled by existing laws of the United States to locate mining ground. Such annual license locations to occupy a frontage of not to exceed 50 feet along the line of vegetation and to extend thence seaward; such license locations to be made and recorded in the same manner, as far as practicable, as placer locations under the general mining laws of the United States and to be subject to the same local mining rules, regulations and usages as apply to placer mines under existing laws of the United States; such license locations to be subject to the right of all persons to have access to and from the sea, and the use of the water thereof for general mining purposes, and such license shall not interfere with commerce and navigation. They also ask that the location of mining claims in said district of Alaska under and by virtue of powers of attorney be prohibited.

THE London Lancet says that if at a height of more than 4000 feet to 5000 feet above the sea sevel a certain amount of strain is put on a normal heart, and by a rise of pressure indirectly also on the large peripheral arteries, this action is multiplied in the cases of heart troubles or in the cases of arteries with thickened or hardened walls. It is specially the rapidity of the change from one altitude to another which must be considered as a call made upon the contractibility of the small arteries on the one hand, and on the amount of muscular force of the heart on the other hand, and if the structures in question did not respond to this call, rupture of an artery or dilation of the heart may ensue. In the case of people totally unaccustomed to high altitudes, it is desirable to take them by degrees, in two or three stages,

A Decision Affecting Oil Lands.

Following is the full text of the decision recently rendered by Judge Ross in the United States Circuit Court at Los Angeles, Cal., in the case of the Nevada Sierra Oil Co. vs. Home Oil Co.:

The subject of controversy in this suit is a piece of public land of the United States, containing under its surface petroleum, and to which both the complainant and the defendants claim to be entitled under and by virtue of the mining laws. As the defendants are extracting large quantities of oil from the ground and prevent the complainant from doing the work thereon required by the laws of the United States in order to make good its alleged claim, an application has been made by it to the Court for the appointment of a receiver to take possession of the property and operate it and do the required work, pending the litigation, for the benefit of the party that may ultimately be adjudged to be entitled to it—the respective parties agreeing that by reason of the operation of wells on adjoining lands no injunction ought, in any event, to be issued, because such action would necessarily result in the draining of a large part of the oil from the land in controversy by those operating the adjoining territory. Upon the hearing of the application a large amount of testimony was introduced on behalf of the respective parties, consisting in great part of conflicting affidavits. In respect to this conflict of evidence the Court would not undertake, at this stage of the case, to make a decisive determination; but if the proof, taken as a whole, shows reasonable ground for the complainant's claim to the land in question, then, clearly, it will be the duty of the Court to appoint a receiver to take possession of it pending the litigation, to the end that the annual work required by the laws of the United States may be performed for the benefit of the party who may ultimately prevail in the suit, and in order to conserve the property for the benefit of the party entitled thereto and prevent the extraction and dissipation, pending the litigation, of the oil, which the proof shows constitutes the chief, if not the only, value of the land. But unless the proof does show that the complainant's case has a reasonable ground to rest upon, it is the duty of the Court to deny the application for courts of equity do not lightly appoint receivers to take property out of the possession of any party.

The undisputed evidence shows that on the first day of January, 1893, the ground in controversy was unappropriated public land of the United States, which had been theretofore surveyed, and by that survey designated as the northeast quarter of section 20, township 19 south, range 15 east, Mount Diablo base and meridian, containing 160 acres, and that on the day named J. E. Wilson, for himself and seven other persons, all of whom were competent locators, undertook to locate the ground under the mining laws of the United States, posting thereon a notice of location claiming the quarter section as a consolidated mining claim, and, it is contended, marked its boundaries in accordance with the requirements of the law. It is not pretended that Wilson or any of his associates remained in actual possession of the land or did any work thereon under that location. On the contrary, one of the averments of the bill is that on the first day of January, 1896, the land was unappropriated public land of the United States open to location under the mining laws. The undisputed evidence also shows that in the year 1895 Frank Barrett undertook to locate the same ground, for himself and seven other persons, as a consolidated mining claim, pursuant to the same laws; but neither he nor any of his associates remained in the actual possession of the ground or did any work under that location. The evidence leaves no room to doubt that on the first day of January, 1896, the land was unappropriated public land of the United States, on which day, as has been said, Wilson undertook, in behalf of himself and his seven former associates, to make a second location under the mining laws, posting thereon the required notice of location, and, it is contended on the part of the complainant, marking the boundaries in accordance with the requirements of the statute. Assuming that to be so, the difficulty with his location of January 1, 1896, is that the proof fails to show that he made, prior to the posting of the notice and the marking of the boundaries, or subsequent thereto under that location, any discovery of mineral in or upon the land. The bill alleges that at the time of the posting of the notice of location of January 1, 1896, Wilson discovered seepages of oil on the land in question, as well as oilsand and shale, but there is no showing in the proof that he discovered any seepages of oil on it. On the contrary, I think the evidence shows beyond any doubt that there never were any seepages of oil on that quarter section of land. There is evidence on the part of the complainant going to show that Wilson discovered sandstone and shale thereon, as well as on adjoining lands, and that there were seepages of oil on some of the adjoining lands, as also wells on one of the adjoining tracts, which were producing more or less oil. But these were nothing more than indications of existing oil under the surface of the ground in question, which might or might not prove to be true. Mere indications, however strong, are not, in my opinion, sufficient to answer the requirements of the statute, which requires, as one of the essential conditions to the making of a valid location of unappropriated public land of the United States under the mining laws, a discovery of mineral within the limits of the claim. (Revised Stats., Sections 2320, 2329; Waterloo M. Co. vs. Doe, 56 Fed. Rep., 685.) Indications of the existence of a thing is not the thing itself. It is entirely true that the statute, requiring as a condition to a valid location, the discovery of mineral within the limits of the claim should, as between conflicting claimants to mineral lands, receive a broad and liberal construction and so as to protect bona fide locators who have really made a discovery of mineral, whether it be under the statute providing for the location of vein or lode claims, or placer claims. As was well said by Judge Hawley in Book vs. Justice Mining Co., 58 Fed. Rep. 106, 120, in speaking of vein and lode claims: "When the locator finds rock in place, containing mineral, he has made a discovery, within the meaning of the statute, whether the rock or earth is rich or poor, whether it assays high or low. It is the finding of the mineral in the rock in place, as distinguished from float rock, that constitutes the discovery, and warrants the prospector in making a location of a mining claim." So in respect to placer claims, if a competent locator actually finds upon unappropriated public land petroleum or other mineral in or upon the ground, and so situated as to constitute a part of it, it is a sufficient discovery within the meaning of the statute, to justify a location under the law without waiting to ascertain by exploration whether the ground contains the mineral in sufficient quantities to pay. The question whether a particular piece of the public land is more valuable for mineral than for agricultural purposes is one that does not arise in cases like the present. While, as has been said, the statute requiring a discovery of mineral as one of the essential conditions of a valid location of land under the mining laws should be liberally construed in behalf of bona fide locators, no court would be justified in ignoring the statutory requirement. Mere indications of mineral, I repeat, do not constitute the discovery of the mineral itself. If so, a location made upon the discovery of such indications, followed by the proper marking of the boundaries of the claim and the doing of the statutory amount of work within the prescribed time, whether the work resulted in the actual discovery of mineral or not, would entitle the locator to apply for, and upon due proof and payment, receive the Government title to the land as mineral land; which obviously would not only be unauthorized by any provision of the statute, but would be in direct conflict with the sections already cited.

What has been said in respect to the absence of any discovery of mineral by Wilson on January 1, 1896, equa ly applies to his pretended location of January 1, 1893, and to Barrett's pretended location of the same ground in 1895, under whom the defendants claim Barrett, during the year 1895, undertook to transfer his right to the ground in question, which had no existence in fact or law, to the Producers' & Consumers' Oil Co., which company, later, undertook to transfer the same thing (which was nothing) to the defendant Miller, and on December 31, 1896, Miller undertook to relinquish to the United States what he did not have, namely, a right to the land in question, and immediately thereafter, to wit, on the 31st day of December, 1896, without having made any discovery of mineral upon the land, undertook to locate the quarter section in question under the mining laws, for himself and seven other persons, by posting the required notice and marking the boundaries. Shortly thereafter he undertook to confer upon Barrett the right to enter upon and explore for and develop oil upon the claim, and to dispose of the oil found there. Barrett thereupon went into actual possession of the land and early in 1897 erected a derrick thereon, and commenced boring for oil, and shortly thereafter transferred, with the consent of Miller, whatever rights he acquired from him to the defendant Home Oil Co., which company proceeded with the boring, and in October or November, 1897, at a depth of about 800 feet, actually discovered oil in the ground, since which time it has remained in the actual possession of the claim and bored several other wells, several of which proved to be flowing wells and in the aggregate yield a large quantity of oil. It would thus seem that, if the location made by Miller and his associates on the 31st day of December, 1896, was properly marked upon the ground and the notice of the location properly posted, followed, as it was, by the actual possession of the ground by those claiming under it and by the actual discovery of mineral within the limits of the claim by them, the requirements of the United States statute in respect to the location of mineral land were answered, no rights of any third party having in the meantime intervened. As said by the Circuit Court of Appeals for the eighth circuit, in the case of Erwin vs. Perego, 93 Fed. Rep, 609-611: "The Acts of Congress prescribed two, and only two, prerequisites to the vesting in a competent locator of the complete possessory title to a lode mining claim. (And the same rule is by the statute made applicable to placer mining claims.) They are the discovery upon unappropriated public land of the United States, within the limits of his claim, of a mineral-bearing lode and the distinct marking of the boundaries of his claim, so that they can be readily traced. No appropriation of the land is made until both these requirements are fulfilled, and until that time the lode and land sought are open to location and appropriation by any competent locator; but when these requirements have been complied with the land is no longer public, but the possession, the right to the possession, and the right to acquire the title are irrevocably vested in the locator." The Court, in the case cited, proceeded to hold that, in the absence of any intervening rights, it is immaterial that the discovery is not made until after the posting of the notice and the marking of the boundaries of the claim, saying that the order in which the statutory requirements are complied with is immaterial so long as the rights of others do not intervene before they are complied with; that the "marking of the boundaries of the claim may precede the discovery, or the discovery may precede the marking; and if both are completed before the rights of others intervene the earlier act will inure to the benefit of the locator as of the date of the later and a complete possessory title to the premises will vest in him as of the later date"—citing Jupiter M. Co. vs. Bodie Con. M. Co., 11 Fed. Rep., 666; North Noonday M. Co vs. Orient M. Co., 1 Fed. Rep , 522; Zollars vs. Evans, 5 Fed. Rep., 173; Strepy vs. Stark, 5 Pac., 111; Thompson vs. Spray, 72 Cal., 528; Erhardt vs. Boaro, 113 U. S., 527. All of this, however, is based upon the supposition, as is expressly shown in the opinion of the Court, that the location has also been made in conformity with any valid State legislation that may exist in the particular State in which the mineral land is situated, and with any valid local rules and regulations of the mining district in which the land may be situated, if any such exists. Section 2324 of the Revised Statutes makes the manner of locating mining claims and recording them subject to the laws of State or Territory, and the regulations of each mining district, when they are not in conflict with the laws of the United States. Kendall vs. San Juan Silver M. Co., 144 U. S., 658. At the time of the actual discovery of oil upon the tract of land here in controversy by the defendant Home Oil Co. in the fall of 1897, at which time, if at all, the location under which the defendants claim became complete, there was in existence an Act of the Legislature of the State of California entitled: "An Act prescribing the manner of locating mining claims upon the public domain of the United States, recording notices of location thereof, amending defective locations, and providing for the deposit of district records with County Recorders, and prescribing the effect to be given to recordation of notices of location and affidavits," approved March 27, 1897 (Stats. of 1897, page 214), the first, second, third and sixth sections of which are as follows:

"Section 1. The location of mining claims upon the public domain of the United States shall be made and perfected as provided in this Act.

"Sec. 2. The discoverer of any vein or lode shall immediately, upon making a discovery, erect at the point of discovery a substantial monument or mound of rocks, and post thereon a preliminary notice which shall contain:

"First—The name of the lode or claim.

"Second—The name of the locator or locators.

"Third—The date of the discovery.

"Fourth—The number of linear feet claimed in length along the course of the vein each way from the point of discovery.

"Fifth—The width claimed on each side of the center of the vein.

"Sixth—The general course of the vein or lode, as near as may be.

"Seventh—That such notice is a first or preliminary notice.

"Such notice shall be recorded in the office of the County Recorder of the county in which the same is posted within twenty days after the posting thereof. Upon the erection of said monument and posting such notice, the discoverer shall be allowed the period of time specified in section three of this Act to enable him to perfect his location as hereinafter provided.

"Sec. 3. Within sixty days from the date of the discovery of a vein or lode, the discoverer must perform fifty dollars' worth of labor in developing his discovery, and distinctly mark his location on the ground so that its boundaries can be readily traced, and must file in the office of the County Recorder of the county in which this claim is situated, a certificate of location, which said certificate shall state:

"1. The name of the lode or claim.

"2. The name of the locator or locators.

"3. The date of discovery and posting of the notice provided for in section two of this Act, which shall be considered as the date of the location.

"4. A description of the claim, defining the exterior boundaries as they are marked on the ground, and such additional description by reference to some natural objects, or permanent monument, as will identify the claim.

"5. A statement that such certificate is the final or completed notice of location, and that he has performed the aforesaid fifty dollars' worth of labor in development work thereof within the aforesaid sixty-day period, stating generally the nature thereof. Said certificate shall be dated and signed by or on behalf of the locator or locators, and verified by them or by some one in their behalf, and when filed for record shall be deemed and considered as prima facie evidence of the facts therein recited. A copy of such certificate of location, certified by the County Recorder, shall be admitted in evidence in all actions or proceedings with the same effect as the original. The performance of such labor shall be deemed a necessary act in completing such location and a part thereof, and no part thereof shall inure to the benefit of any subsequent location."

"Sec. 6. All locations of quartz or placer formations or deposits, hereafter made, which do not conform to the requirements of this Act, in so far as the same are respectively applicable thereto, shall be void."

In the view I take of the present case, it is not necessary to decide to what extent, if at all, this Act, while in force, was applicable to placer claims, or whether, in view of this State legislation, the location under which the defendants assert title is or is not invalid. Assuming that the defendants failed to comply with the provisions of this State legislation, and that such failure operated to open the land to the location of any other competent locator, the fact remains that the defendants continued in the actual possession of the land and continued to mine the same for oil, and that they were so in possession and so engaged on the 26th day of May, 1898, when Frank H. Jackson, for himself and the seven other persons who had theretofore been associated with Wilson, undertook to locate the ground in question under the mining laws. That location, according to the affidavit of Jackson, which was introduced in evidence on behalf of the complainant, was based upon these facts, as constituting his discovery, and nothing else: "That on May 26, 1898, he (Jackson) was on said northeast quarter of said section; that on said date he discovered indications of oil-bearing strata on said quarter section at and near the southeast corner thereof. Said indications were as follows: At the said southeast corner the surface is covered with broken-up formations of sandstone and underneath, less than 1 foot beneath the surface, affiant found the sandstone in place. A few feet east and northerly from said corner a ravine cuts the formation, showing the solid sandstone stratum in place, being the same stratum that underlies the said corner a short distance above said corner in said ravine and about on the west line of Section 20. There is a highly mineralized spring, charged with soda and other salts, such as are almost invariably found in the proximity of oil-bearing sand, and which indicate the oil sand is in the immediate neighborhood. The sandstone referred to has some strata of shale and said sandstone and shale are of the character that usually carry oil in said district, and said shale bears indications of bituminous matter. That on said date he located the said northeast quarter section as a placer mining and oil claim as follows," giving the boundaries. The previous observations upon the subject of discovery dispose of this attempted location by Jackson for himself and his seven associates. It was, as he himself testifies, based merely and solely upon surface indications of oil, which are insufficient to constitute a discovery. It is doubtless true, as will appear from what follows, that Jackson, at the time of the making of his attempted location on May 26, 1898, knew of the actual discovery by the defendants of oil upon the land in question; but it is perfectly plain, from his own affidavit, that he did not base his location upon any such knowledge. It is also true, as a matter of law, that it is not necessary that a locator should be the *first* discoverer of mineral upon the land in order to make a valid location; but he must not only have a knowledge of the former discovery, but such actual discovery must be *adopted and claimed by him* in order to give validity to his location. Jupiter M. Co. vs. Bodie Con. M. Co., 11 Fed. Rep., 666, 676. This, as has been shown, Jackson did not do, but, on the contrary, based his location upon mere surface indications of the existence of oil, which, as has been said, is insufficient to constitute a discovery. Moreover, I think it clear that the attempted location by Jackson, made on the 26th day of May, 1898, was invalid for another reason. The defendants were at that time in the actual possession of the claim in controversy and actually engaged in mining it for oil. It appears from the affidavit of C. A. Canfield (one of the parties interested in the defendant Home Oil Co.)—and this I do not find anywhere contradicted—"that in the month of May, 1898, J. E. Wilson (who, Jackson swears in his affidavit, assisted him in marking the boundaries under the location made by him May 26, 1898,) and Frank H. Jackson came to Oil City and at affiant's invitation stayed at his cabin and where they were entertained as guests; that the morning after they came to affiant's cabin, as aforesaid, affiant saw them engaged in the erection of a monument. He went to them and asked them what they were doing, whereupon said Jackson told him that they were perpetuating the monuments defining the line of Section 17 in said township and range; that affiant thereupon showed them where the south center corners of said Section 17 were, whereupon they moved the rock over to the corner so indicated; that after the said Wilson and Jackson left the said monument the said affiant went and got I. F. Postom, who was then manager of the Home Oil Company, operating on the northeast quarter of Section 20, and he and said Postom tore down said monument to make an examination thereof and to see if they had left any notice of claim of any kind whatever therein, and they found nothing therein, and they thereupon restored said monument; that some time in June, 1897, some person, to affiant unknown, entered upon the said northeast quarter of Section 20, went to the southwest corner thereof and partially erected a derrick; that as soon as said affiant discovered that the derrick was there he went down and made an examination of it and found nobody around or in possession of that portion of said quarter section in connection with said derrick; that affiant says after his first visit there, later in the same day the same or other parties placed or added more to the structure of the said derrick, but without completing it; that thereafter no further work was done by anybody in connection with said derrick, nobody remaining in possession of or claiming it or to the ground in connection therewith, and the next time that the affiant visited that portion of the ground, which was a few weeks later, he found said derrick was down." There are affidavits on behalf of the complainant to the effect that the derrick thus spoken of was built by Wilson and that he completed it at a cost of one hundred dollars, and that it was so built under and pursuant to the location made by Jackson on May 26, 1898 It is true that upon mineral land of the United States, upon which there is no valid existing location, any competent locator may enter, even if it is in the actual possession of another, provided he can do so peaceably and in good faith, in order to initiate a location for himself; but no right upon any Government land, whether mineral or agricultural, which is in the actual possession of another, can be initiated by a forcible, fraudulent, surreptitious or clandestine entry thereon. Such entry must be open and aboveboard and made in good faith. Belk vs. Meagher, 104 U. S , 279; Atherton vs. Fowler, 96 U. S., 513. One who is in the actual possession of a mining claim, working it for the mineral it contains and claiming it under the laws of the United States, whether the location under which he so claims is valid or invalid, cannot be forcibly, surreptitiously, clandestinely or otherwise fraudulently intruded upon or ousted while he is asleep in his cabin or temporarily absent from his claim. I think it is clear from the showing made upon the hearing of this application: first, that Jackson did not make any such open and good faith entry upon the actual possession of the defendants of the quarter section in question, upon which he could invalidate any valid location thereof under the mining laws, and, secondly, that, according to his own affidavit, he made no such discovery of mineral upon the land as the statute requires.

For the reasons stated, I am of the opinion that the complainant is not entitled to the appointment of a receiver herein, irrespective of the question of the validity of the location under which the defendants assert title and irrespective of other questions argued by counsel.

An order will be entered denying the application for the appointment of a receiver.

ROSS, Circuit Judge.

[Endorsed]: No. 855. U. S. Circuit Court, Ninth Circuit, Southern District of California. Nevada Sierra Oil Co., a corporation, substituted for Dewey Mining Co., a corporation, vs. the Home Oil Co., et al. Opinion on Motion for Receiver. Filed Dec. 18, 1899. Wm. M. Van Dyke, Clerk.

Of Interest to Steam Freighters.

Written for the MINING AND SCIENTIFIC PRESS by S. I. HALLETT.

While traveling in the San Luis Park of Colorado, I observed a peculiar condition of roads that might be of interest to any one freighting in a desert region, where the sand is very deep and thick, and particularly of interest to steam freighters, where a good road is really a part of the machinery.

San Luis valley has once been the site of an old lake, and the whole valley, with few exceptions, is very sandy, a loaded wagon sinking from 4 to 10 inches in the coarse sand. The farmers in that section have placed on the roads a covering of from 6 inches to 1 foot of wheat straw. This they cover again with a small amount of sand, and this roadbed makes the finest highway that I have ever traveled over in the country—springy, and yet not allowing a loaded wagon to sink into it at all; perfectly good after a rain or in the driest weather, it enables the farmers to haul three times as much with the same power as though it were not there. The country being very dry, it makes a lasting road, as the wheat straw, after having been plowed under for several years, when brought to light, is as bright and fresh as when it was first covered up, not rotting in the slightest degree.

The difference is very marked the minute that you leave these roads and get into the heavy sand. It is as cheap as anything that could possibly be placed on the road to better it. The country is a large wheat producing one, and such straw as they do not use is burned, owing to the fact that it will not decompose when plowed under in their wheat fields. The straw breaks off in small pieces, being very brittle, and seems to mix with the sand, forming an almost perfect macadam road.

Possibly it might be of benefit to mines using steam wagons to try to better their roads by this means, if they have the wheat straw, or, if not, with the best wild hay at their command. The difference in the ease of travel and the very marked difference in the amount of load that can be hauled strikes one forcibly.

THE New York Auto-Truck Co.'s first truck is completed. The platform of the truck stands about 4 feet from the ground. The steering is done by a wheel in front of the driver's seat. The power and speed are controlled by two levers operated by the driver's feet. The compressed air cylinders are in front of the rear wheels and the driving mechanism is under the body of the truck. The truck weighs eight tons, can carry ten tons, and its speed is nine miles an hour.—Blacksmith and Wheelwright.

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MINING SUMMARY.

U. S. Gold and Silver Production in 1899.

The preliminary estimate of the production of gold and silver in the United States during the calendar year 1899, made by Mr. Roberts, the Director of the Mint, shows a total gold production of $70,694,170, an increase over the production of last year of $6,236,670. The production of silver during the year is estimated at $74,424,696, an increase during the year of $4,040,211. The gold production by States for the years 1899 and 1898 is given as follows:

STATES.	1899. VALUE.	1898. VALUE.
Nevada	$ 2,442,000	$ 2,994,500
Washington	306,202	766,200
Oregon	1,550,387	1,177,600
Alaska	4,609,819	2,524,800
California	14,952,392	15,637,900
Idaho	2,480,620	1,716,900
Montana	4,919,897	5,126,900
Utah	3,369,509	2,285,400
Appalachian States	337,344	327,700
Colorado	26,000,000	23,105,300
South Dakota	6,120,000	5,699,700
Arizona	2,500,000	2,465,100
New Mexico	600,000	539,000
Wyoming	6,000	.....
Others	.....	500
Totals	$70,694,170	$64,457,500
British Klondike.	16,114,150	.....

The estimated production of silver during 1899 and 1898 is given as follows:

STATES.	1899. VALUE.	1898. VALUE.
Nevada	$ 1,254,800	$ 1,040,808
Washington	452,525	328,921
Oregon	193,940	168,081
Alaska	258,585	119,467
California	1,396,363	830,448
Idaho	5,171,717	6,560,065
Montana	20,040,130	19,144,663
Utah	9,696,969	8,385,810
Appalachian States	9,057	2,068
Colorado	31,208,637	29,498,958
South Dakota	550,700	196,913
Arizona	3,000,000	2,904,954
New Mexico	600,000	549,833
Texas	600,000	611,426
Others	.....	42,020
Totals	$74,424,696	$70,384,485
British Klondike.	.....	252,000

ALASKA.

Alaska during 1899 doubled its gold product over 1898. The record for 1899 was: Gold $4,917,821, silver $82,680, as compared with an output of gold of $2,517,121 and of silver of $49,152 in 1898. Of the total output of Alaska, $2,408,830 gold and $3935 silver came from the beach and placers of Cape Nome and vicinity.

The Nome Gold Digger, a weekly, printed at Nome, publishes the prices on the bill of fare of the principal restaurant: Tenderloin steak, $3; reindeer steak, $2; ptarmigan, $3; boiled mackerel, $1.50; coffee and doughnuts, 50 cents; corn beef hash, $1; oyster stew, $1.50; hot cakes and syrup, 75 cents; club sausage, $1.50; fried ham, $1; salmon, $1; sardines, per box, $1; three eggs, $2; pies, each 50 cents; loaf bread, 25 cents; toasted cheese, $1. Two-story, seven-room dwellings are advertised in the Gold Digger for rent at $200 per month; wagons and teams for hauling may be had for $10 per hour; a shave cost $1, a haircut $1.50 and a bath $2. A laundry offers to wash flannel shirts at 50 cents each, colored linen at 75 cents and a "white boiled shirt" at $1. Cigars and drinks cost 50 cents each, lumber is $250 a thousand, shingles $7.50 a bunch and wood for fuel $35 to $50 per cord.

ARIZONA.

COCHISE COUNTY.

(Special Correspondence). — It is generally supposed that the mines of Tombstone are worked out. This is a mistake. The population has dwindled from several thousand to a few hundred and the large mines have mostly been shut down, but for the number of people living there there is no more prosperous community in Arizona. Only one or two mines are being worked, and these are above water level. Shipping receipts show that the ore runs 326 ounces silver and 3½ ounces gold per ton. If a syndicate should take all these properties and work them under one management, and reduce the ores on the ground, Tombstone would soon be as large a producer as ever.

The town depends largely upon the outlying tributary camps. The Turquoise district, not far away; the Dragoon mountains, where the Hardy syndicate of Chicago has opened up a shipping copper proposition; the Pearce gold mine, which has produced several millions; the Huachucas, where the Exposed Reef M. Co. of Akron, Ohio, headed by P. J. Boucher, are opening a large body of gold-bearing quartz which will average $8.33 per ton, and to reduce which a 40-stamp mill has been ordered; and other districts within a radius of thirty miles make business for Tombstone.

Bisbee is one of the best copper camps in the Territory and contains a population of about 6000. There is not a Chinaman in it. Vagrants are given a half hour to leave town. Wages are $3.50 to $4, and the cost of living high. The town is not incorporated, but has a good water system, owned by E. B. Mason and associates. There is a handsome schoolhouse, given by the Copper Queen Co. and largely supported by it; a library, with a large hall overhead, also a gift to the town by the same company.

The first furnace for the reduction of copper ores in the district was constructed in 1880, and had a capacity of forty tons per day. This has grown, until now the capacity is 800 tons per day. Just now the furnaces are shut down for a period of five or six weeks for the purpose of repairs and the putting in of electric cranes to handle the molten metal. It is stated that about fifty tons of copper bullion are produced daily. The deepest shaft on the property is not more than 600 feet—and there are forty miles of tunnels, drifts and crosscuts. The company owns and operates the Arizona & Southeastern Railroad, which connects Bisbee with the Southern Pacific system at Benson. It is stated that ore bodies have been opened which insure an output at the present rate for twenty years.

The credit for the success of this enterprise is largely due to Messrs. Ben and Lewis Williams, who have been superseded by Walter Douglas, the Williams brothers going to California, it is said to take charge of a large mining proposition in that State.

Other copper properties adjacent to the Copper Queen are being opened, among them the Lowell & Arizona Co.'s property of Boston, Fred. Fenner Supt. A shaft 400 feet deep, besides drifts at the 100, 200 and 300 levels, in ore, have been run on the property during the past eight months.

Bisbee is also coming to the front as a gold producer. The Easter Sunday G. M. & M. Co. is operating a gold property of four claims in the Warren mining district, four miles east of Bisbee. They have sunk a shaft 115 feet, in sinking which they sacked twelve tons of ore, samples from which gave returns of $194 gold, three ounces silver and 2% copper. Three hundred tons of second-class ore on the dump runs $15 per ton. A tunnel is now being driven to tap the ledge at a depth of 225 feet and is in 174 feet. This company is an Arizona corporation, organized under the laws of this Territory. It is owned by ten men.

Benson is the shipping point for outlying mining camps situated in the Whetstones, Dragoons, Chiricahuas and Rincons.

Within a mile of Dragoon station, on the Southern Pacific, is the property of the Dixie M. Co., a copper proposition, incorporated under the laws of the Territory. It consists of ten claims and has over 500 feet of development. Besides copper, it carries gold and silver values. This is owned by Louisiana capitalists and is being developed under the supervision of its president, R. R. Harper, aided by Vice-President F. S. Webster of Benson. The wages paid are $3.50 per day. After the 1st of January a gasoline hoist is contemplated, which will permit the employment of a larger force.

In the Rincon mountains M. F. Castaneda of Benson and his associates are opening a copper property of nine claims, which is in shipping condition.

In the Whetstone mountains, eight miles from Benson, Mr. Castaneda is the owner of a fireclay property, the product of which is being used by the Copper Queen Co. at Bisbee in the furnaces and converters. Formerly the Copper Queen Co. were obliged to obtain fireclay from Iowa.

Tombstone, Dec. 28th, '99.

GRAHAM COUNTY.

The Helvetia is reported to be turning out nearly 100,000 pounds of copper daily, running two-thirds of its capacity. It is also said large bodies of sulphide ores have been developed, and the end of the crosscut has not yet been reached. A second jacket will be installed. Three hundred men are employed.

CALIFORNIA.

Superintendent Leach and Statistician Yale of the United States Mint in San Francisco have prepared a preliminary statement, based on receipts at the United States Mint and other bullion depositories on this coast, showing that California produced in 1899 gold to the amount of $15,000,000, and silver $636,000.

AMADOR COUNTY.

Good ore is being taken from the South Eureka mine, near Sutter Creek. The mill is an electric plant.

At the Amador Queen mine, between Jackson and Middle Bar, a sump is being sunk at the 1200-foot level prior to drifting. Supt. Dye reports that the company has been reorganized.

It is reported that a better grade of coal than ever heretofore found has been opened in the No. 3 mine near Carbondale. It is lignite.

C. E. Purrington, superintendent of the Gover mine, north of Amador City, reports the shaft on the Fremont property of the Gover Co. down 40 feet; that the hoist is finished and one shift is working in the shaft. After Jan. 1 three shifts are to be put on.

Sinking has been stopped in the new shaft at the Oneida mine at a depth of 2100 feet, where a station will be cut and a crosscut run to the vein. The old shaft has been unwatered to a depth of 600 feet.

Jackson Dispatch: At the Mutual mine, between Sutter Creek and Amador City, the buildings over the engine and hoist are up and the shaft is down over 260 feet. New and heavier machinery that will sink to 3000 feet is to be put in. The quartz in the shaft is looking well.

To the Oneida 60-stamp mill will be added a compressor with a capacity of thirty drills. The water in the old shaft is down and the shaft repaired to 500 feet. The new shaft is down 2080 feet. Sinking has temporarily ceased. A level is to be opened at 1200 feet.

Amador Record: At the Lincoln mine at Sutter Creek the sinking of the shaft has been completed to 1263 feet and a chute and station are being cut out at the 1200 level. Power drills will be installed. On the 500 level they are drifting on the west vein recently encountered. The ore body at that point is not large, but good milling ore. In the west crosscut that was driven at the 500 two new ore bodies were encountered, the first 135 feet west of the main ore body and worked by the former company. The footwall ore body was 70 feet farther west, making it 205 feet west of the main east ore channel.

Rock from the ledge on the 1350-foot level of the Central Eureka milled at the Zeille mill it is estimated will yield $10 in free gold and the sulphurets $150 per ton. This rock is not from what is known as the rich lead.

BUTTE COUNTY.

Oroville Register: It is reported that the owners of the Magalia mine, Rideout & Haggin, have made a proposition to the owners of other mining land in the vicinity to run a drain tunnel, so that all the mines could be worked by means of this tunnel. If the other mine owners are willing to have this done, and give a certain amount of land or stock in exchange for the tunnel, then one of the best mining districts in the State would be opened and hundreds of men would be employed. Four years ago this property was examined by J. O. Rusby, at request of the owners, who reported that at an expense of $150,000 a drain tunnel could be run that would place the mine in a position to be worked at less expense. W. R. Eckart also examined the mine at the instance of the owners and he gave a similar opinion.

CALAVERAS COUNTY.

Calaveras Chronicle: In excavating for the engine room at the Emerson mine, near Mokelumne Hill, a parallel ledge was found, 60 feet west of the shaft, the ore having the same characteristics as the Moser ledge; a third ledge was encountered, which looks well, and both leads show an average width of 5 feet.

EL DORADO COUNTY.

At the Schneider mine, in Mud Springs district, Bryant & Hill have struck rich ore. Their tunnel is in 750 feet, and the ledge is 3 feet wide, showing free gold.

Eighteen men are employed at the Strahle slate quarry in Kelsey district.

NEVADA COUNTY.

F. Zeitler of the Champion mine, of Nevada City, has bought from Towle Bros. Co. 18,000 acres of land lying between Emigrant Gap and the town of Washington. The tract includes the line of the Towle Co.'s narrow gauge railroad. The lumber has been cut from most of it, but there are thousands of acres of it covered with mining timbers, poles and fuel. Large gold-bearing quartz and gravel deposits exist within its boundaries.

The Azalea drift mine of Placer county has been closed for the winter. During the past nine months the tunnel was extended 1076 feet, giving a total length of 2256 feet. It is expected that the channel will be reached in 750 feet.

The North Bloomfield mine, at one time the largest hydraulic mine in the State, is now being operated by the drift method.

Penrose & Harker are putting in a restraining dam at Relief hill, preparatory to hydraulicking under permit from the Debris Commission.

Nevada City Herald: The Crescent and Kate Hays mining claims, near the Pennsylvania and W. Y. O. D. mines at Grass Valley, have been sold to I. Haas for $20,000. The Kate Hays has produced nearly $100,000, but has not been worked since the early '60s. It has not been determined what disposition will be made of the property.

PLACER COUNTY.

The Big Gun hydraulic mine, at Michigan Bluff, is working with a good head of water, but progress is slow, as the top ground slides into the pit.

The lower tunnel of the Eureka drift mine, six miles northeast of Sunny South, is in 3276 feet and is in a blue lead. The upper lead, which is 200 feet higher, is of grayish color.

At the Jupiter, it is reported, $3000 was taken out during December.

Thirty-five men are working at the Gold Blossom, near Ophir. They are opening up the lode at the 400 level.

PLUMAS COUNTY.

The Four Hills mine, situated close to the line between Plumas and Sierra counties, and six miles south of Johnsville, is owned by Moody, Grant and others of San Francisco. It is at an altitude of 7400 feet. By means of two tunnels, the mine is being opened and a large body of ore is exposed. H. E. Averill is Supt. of the mine. In spring the mine will be operated with a large force. The crushing of ore will begin in the old mill this month.

RIVERSIDE COUNTY.

A run of thirty tons of ore from the O. K. mine, in Virginia Dale district, fifty miles northeast of Walters Station, milled $800 in the company's mill. The mine is down 250 feet, with several hundred feet of levels.

The lepidolite mines near Pala are shipping 2500 tons of that mineral to New York. It is reported that it is worth $25 per ton at the mine. Lepidolite is lithia mica of variable composition, containing usually aluminum, iron manganese, potassium, sodium, silicate, etc., and is chiefly valuable for the lithia. It is a beautiful micaceous (scaly) mineral, ranging in color from silver gray to violet, rose red, yellowish and white. It is from fine granular, the scales being arranged in groups, to coarse in texture. It is soft and easily scratched by the finger nail. It is usually associated with tourmaline, and the Pala deposit is no exception, containing a quantity of pink tourmaline (rubellite) arranged in groups of radiated crystals.

SAN DIEGO COUNTY.

San Diego Union: A find of copper ore was made some time ago on the Daley ranch, at San Vicente. At the time of the find the ranch was involved in litigation, but the suit has since been settled. T. J. Daley of San Diego is the owner. The width of the ledge is 23 feet. Assays show that the ore contains 8% copper, 11 ounces silver and $2.10 gold to the ton. A shaft is being sunk.——Twenty-five men are at work on the Owens mine at Julian. ——A rich lead has been struck in the old Cravath mine at Escondido. The ledge is 19 inches thick and is reported rich in gold.——The lessees of the Escondido mine milled thirty-five tons of rock recently and cleared over $1100, the work of four men for twenty-six days.

SANTA BARBARA CONUTY.

At Summerland, where oil is being pumped from under the sea, the most easterly well on the beach is reported, at a depth of 400 feet, to have developed into a gusher, flowing seventy-five barrels the first day.

SANTA CLARA COUNTY.

The Silver Creek M. Co. is developing an old quicksilver mine on Silver creek. Thirty years ago the mine was worked and it is said that nearly $300,000 worth of quicksilver was mined. A new smelter is projected.

The Silver Creek M. Co., which was recently organized at San Jose, has commenced the development of the old Quicksilver mine, on Silver creek. Thirty years ago the mine was worked and rude furnaces built and considerable quicksilver produced. The ore occurs in sandstone near a serpentine contact, with the geological conditions similar to those found at the large quicksilver mines.

SHASTA COUNTY.

(Special Correspondence.)—In the Bowery Belle mine, owned by Kahny & Burgbacher, near Shasta, a contract has been let for an additional 100 feet of tunnel. The present length of the tunnel is 385 feet, on a ledge from 4 to 30 feet wide, of fair-grade ore.

D. McCarthy of Taylor has leased the old Minnesota mine, near Copley, and has put men at work to open the old works.

Panter & Litsch last week opened a new ore body in the Evening Star mine, in

Old Diggings, that is 12 inches wide and assays over $1000 per ton.

Work has been resumed at the Mount Shasta mine, under the superintendency of W. G. Scott. A new ore body of high grade was discovered in this property last week.

Machinery is being placed on the Black Spider mine, near Keswick, by a San Francisco company, preparatory to unwatering the shaft.

On the Bennington group, near Iron mountain, work began last week sinking a winze from the old Nellie tunnel. This property was recently secured by O. E. Williams of Ukiah and C. F. Bunker of San Francisco. The property comprises nine claims, and has not been operated for eight years.

Redding, Jan. 1st, '00.

SISKIYOU COUNTY.

Yreka Journal: Prospects of gold quartz have been discovered at Sheep Rock, Shasta valley, north of Mt. Shasta, and a number of men from Edgewood have gone there.——Supt. Brokaw of the Quartz valley hydraulic mines is running the giants with a full supply of water.——The Yreka Creek Dredger Co. has started work on the construction of the dredger at Hawkinsville.——The new copper ledge on Dutch creek, six miles from Klamath river, in the Virginia Bar district, is showing good ore.——The cold weather of the past week has checked mining to some extent by freezing the water supply of small streams at the head of same in the high mountains.

Several claims have been located in the Black Buttes, near Sheep Rock, where prospects of gold and copper have been discovered.

Work has been resumed at the Sheba quartz mine and mill on Patterson creek this week with a full force. An air compressor and other modern apparatus have been added.

TUOLUMNE COUNTY.

The Spring Gulch mine, owned by R. Marshall, and located five miles southeast of Carters, has been taken under bond and work will begin on the mine early in 1900. The shaft is 500 feet deep.

The 5-stamp mill building on the Free Lance mine, situated on Berger's ranch, twelve miles southeast of Sonora, is nearing completion.

Ore is being stoped in the east and west drifts on the 300-foot level of the Hope mine, at Sonora. The vein is 28 inches wide, carrying free gold and a small percentage of high-grade sulphurets. Fifty tons of the ore is being hauled to the Bonanza mill for treatment. The last run on seventy-five tons yielded $25 per ton in free gold and the sulphurets were rich.

The main shaft of the Little Wonder mine at Big Oak Flat is down 150 feet and crosscutting is in progress. The vein is 4 feet wide and mills $8 per ton. A rich shoot has been found on the hanging wall side by crosscutting. A 10-stamp mill is to be built.

At Tuttletown the Street mine is being developed, and a strike is reported on the 200 level. The vein is 12 feet wide and contains high-grade ore.

The north extension of the Mount Jefferson, at Groveland, is being opened. A vertical shaft will be sunk in the hanging wall to the vein.

The Bodie, Cal., company which has been operating the Excelsior claim, above Confidence, will remove the machinery from that mine to the Hazel mine, seven miles north of Soulsbyville.

Sinking is to be resumed on the Bown mine, near Robinson's Ferry.

It is reported that arrangements are being made to resume work on the Genevieve mine, a mile west of Soulsbyville. The hoist at this mine, when operating, is run by compressed air furnished by the Black Oak Co. The pipe line is 4000 feet long and 2 inches in diameter. The air is heated at the Genevieve by means of a small fire on the grate of the boiler, which is used as an air receiver. It is stated that the effective pressure is thus rendered higher at the Genevieve than when it leaves the compressor at the Black Oak.

The new ore shoot recently discovered in the Black Oak mine, near Soulsbyville, is entirely distinct from that worked heretofore. The discovery was made in the lower levels and is supposed to afford several hundred feet of backs.

COLORADO.

The following estimate is given of the mineral yield of the State in 1899:

Gold	$31,329,056
Silver	12,680,256
Copper	1,854,226
Lead	4,461,259
Zinc and manganiferous iron	557,500
Stone and marble	1,825,000
Iron and steel	7,681,719
Coal	8,750,000
Oil	1,500,000
Total	$70,139,016

BOULDER COUNTY.

It is estimated that the gold output of Boulder county mines for 1899 will reach $1,000,000.

Another smelter for this county is under consideration by Eastern people.

John Wright of the Mountain View mine, near Ward, has bought the Rainbow group of six claims adjoining the San Blas mine.

The Pennsylvania mine at Sunnyside is being unwatered and drifts are to be run from the 200 and 300 levels.

A recent shipment from a large vein in the bottom of the Melvina shaft in the Magnolia district ran $361 to the ton.

The mining town of Caribou was almost totally destroyed by fire last week.

CLEAR CREEK COUNTY.

Idaho Springs Gazette: The mines around Georgetown and Silver Plume, which have been worked since the drop in silver, have made a regular production the past year. The Pelican-Dives and others of the group operated by J. H. Robeson give employment to a large force. New ore bodies have been opened, and at the Stevens group the levels are coming into high grade mineral, none of which can be moved until the snow has disappeared.

DOLORES COUNTY.

The 100-ton concentrating mill at Rico started up on the 30th ult. Construction was commenced in August. It cost $30,000.

GILPIN COUNTY.

Work has been commenced on the new shaft house of the California mine; it will be 110x100 feet.

The Modoc has opened up a good body of copper sulphide ore in the breast of the east drift, 300 feet from the shaft.

The Robert Emmet is running six air drills on ore and keeping twenty stamps in operation.

Mgr. Johnson of the Lotus mine, in Russell gulch, has 300 tons of ore, which will be treated at the concentrating plants at Idaho Springs.

LAKE COUNTY.

A 4-foot stratum of high-grade sand carbonate has been found in the Penrose mine at Leadville. This ore occurs in a large mass of low-grade ore. Assays show 332 ounces silver and 25% lead. A drift from the Midas is approaching Penrose workings, and one from the latter is headed toward the Midas. They are separated by a vertical distance of 23 feet and will be connected by a raise. All the ore shipped from the Penrose is from development work, no stoping being done on the large ore body discovered early last fall. The main drift has penetrated it 300 feet. Near the northeast end an upraise was recently completed of 35 feet and the top was not reached. The daily production is 200 tons and 100 men are employed. Three classes of ore are shipped: the fluxing iron, the argentiferous iron and the high-grade lead carbonates.

Leadville mines are swamping the railroads and smelters with ore. The yards of both are crowded with cars loaded with ore of all kinds, and the rolling stock of the railroads is taxed to its utmost to get the ore to the local, Denver or Pueblo smelters.

During 1899 the Fanny Rawlings of Leadville made a gross output of $350,000, the ore being the best average grade in the camp, some of it including 7% to 9% copper, besides the gold and silver values. The mine has a good equipment for deep mining and will in 1900 duplicate its output of 1899. It was opened under the management of J. F. Walsh.

Leadville Miner: The new shaft of the Evening Star, on the Morning & Evening Star Con., is in ore. In the drift from the 130-foot level, in the first contact, a 6-foot face of mineral has been broken into, nearly solid lead carbonates, assaying 20% to 30% lead and fifty to eighty ounces silver, making an ore worth from $50 to $75 per ton. Lessees McGowan & Co. expect to commence shipping after New Year's. The ore is an extension of the shoot worked by Collins & Co. in the Kitchen shaft. On the Morning & Evening Star Con. ground are thirteen shafts, going by lessees, from 700 feet up. It has been one of the most regular of fluxing and steel-iron producers.

MINERAL COUNTY.

It is reported that a new mill is to be built at Creede. Options on the ground have been secured or purchased. The site of the new plant will be at the forks of Willow creek. The mill is to be erected by owners of the large dumps in the camp. The mill is to have a capacity of 400 tons of ore per day. The mill dump on the United mines was profitably worked by the Creede Co-operative Co., who erected a mill of 100 tons capacity over a year ago, and since then that dump has been worked at a good profit.

OURAY COUNTY.

The Herald estimates the output of the county as $2,250,000 gold, $910,076 silver, $121,922 lead and $127,321 copper, making a total of $3,409,319. Last year the gold output was estimated at a little more than $800,000.

The improvements in mines and mills in the county during the past year have amounted to $300,000.

An addition of twenty stamps will be made to the Camp Bird mill, the American Nettie will erect a 10-stamp mill, and the Atlas a 10-stamp mill during 1900.

The management of the Saratoga group, at Ironton, will erect a smelter in the spring of sufficient capacity to treat its own ores and do custom work.

PARK COUNTY.

An addition has been made to the machinery plant of the Brownlaw mine.

A strike of $50 ore is reported in the Bessie mine on Cover mountain, Freshwater district.

PITKIN COUNTY.

The Keystone mine, joining the La Salle at Aspen, has been leased and will be worked.

The La Salle mine, now being operated under the management of G. S. Newman, contains a large body of good grade silver-lead ore. The Keystone claim adjoins the La Salle and the latter's contact extends into the Keystone property and is the main Aspen contact. There is another contact crossing the Keystone. Both of these can be traced on the surface. They are near together in the Keystone and converge on their dip, forming a junction at depth. Development work has been commenced by the lessees on the Keystone and a steam hoist is being erected.

SAN JUAN COUNTY.

The Tiger mine at Silverton is working thirty men.

A. Jackson is finding rich gray copper in his City View claim on Anvil mountain. The ore occurs in pockets.

W. Neff has a carload of ore broken from his Dewey claim, Cement creek. The vein from wall to wall measures 4 feet and for the greater part is said to be in ore.

P. S. Rider, Supt. of the Enterprise mine at Rico, and also agent for the Silverton M. Co., owners of the North Star property on Sultan mountain, states that work is to be resumed on the Star mine.

SUMMIT COUNTY.

The Augusta M. Co. has let a contract for driving a 350-foot tunnel on the Juventa group from 100 to 500 feet deep.

The two-compartment shaft of the Blue River Gold Excavating Co. has reached bedrock and a sump cut in the bottom. A drift is to be run 75 feet to the point where the excavator pit will be located.

C. A. Finding will prospect with a diamond drill from the bottom of his 300-foot shaft on Shock hill to discover whether or not blanket veins exist below the sulphide contact cut by the shaft.

TELLER COUNTY.

The strike recently made in the Mackin lease of Orpha May No. 2 is proving a bonanza. A forty-ton shipment returned 628 ounces fine gold. The old shaft was down 350 feet, where a good vein was disclosed, but several hundred feet of drifting done upon it failed to find ore. Mgr. Mackin decided to sink the shaft another lift to see if with additional depth values would be found. Hundreds of feet of drifting at the level above failed to find a pound of pay ore. Before 4 feet of sinking had been completed low values were encountered, but at every shot it improved and has been improving since. The shipment mentioned was comprised of ore saved in sinking.

In the case of the Roxana M. Co. vs. Doctor M. Co., of Cripple Creek, Judge Hallett of the United States Circuit Court, at Denver, last week decided in favor of defendant company. It was an apex case, the Doctor having the apex and claiming the extralateral right, which was denied by the Roxana Co., which sought to enjoin the Doctor Co. and a lessee, J. Winchester.

The Uncle Sam mine of the Blanche G. M. Co., at Cripple Creek, is shipping. Ore was found last week 54 feet from the surface, and the vein is large, exceeding 12 feet. Samples show three ounces gold to the ton. A carload will be shipped daily.

A recent shipment of 27½ tons of ore from the Isabella mine, at Cripple Creek, is reported to have yielded $219,090.92 net. The total amount of ore in the shipment was 360 tons, 144 tons of which was Isabella ore, the balance being from the Independence and Ajax mines. The total gold in the ore amounted to 13,000 ounces, and the silver to 1000 ounces. The net value of the ore was $253,460.30, of which amount the Isabella received the sum of $219,090.92. The shipment was the largest ever sent from the district at one time.

The Woods Investment Co. intend running a tunnel from their property at Victor under the Cripple Creek district, terminating under the town of Cameron, on the east side of the district, a distance of 14,000 feet. The cost will be about $275,000. The tunnel will be for transportation. The big tunnel is in 300 feet. After March 1st, when the Gold Coin mine has its air compressor plant in place, work will be expedited by the use of power drills driven by air furnished by the plant. This tunnel will tap the properties of the Battle Mountain Con. at a depth of 640 feet, the Deadwood at 936 feet, the Wildhorse at 1034 feet and the Damon at 730 feet. The tunnel will end under the town site of Cameron at a depth of 420 feet.

A 300-foot contract has been let by the New England & Cripple Creek G. M. Co., sinking in the shaft to open the Grand View and New Bedford claims on Straub mountain. A shaft house has been completed on the New Bedford. A gasoline hoist will be installed.

A strike is reported on the Columbia claim of the Cripple Creek Columbia Co. on Beacon hill, adjoining the El Paso, at a depth of 300 feet and 25 feet from the shaft. There are 2 feet of ore worth $35 a ton in car lots. In the center of this there are 10 inches of rich ore. The lessees will sink another 100 feet.

The Modoc is shipping a carload a day of ore carrying from three to seven ounces. Machine drills are in use on development.

IDAHO.

An estimate of the mineral production of Idaho for 1899 gives the following results: Gold, $2,500,000; silver, $6,103,000; lead, $4,960,410; copper, $60,000.

ADA COUNTY.

Reports of rich strikes come from the Miller mountain district, discovered last year, northeast of Boise City. It is said in one claim, the Magnolia, a 3-foot vein of ore runs $600 in gold.

IDAHO COUNTY.

In the Spokane-Buffalo Hump Co.'s property at Buffalo 9 feet of $25 gold ore is reported.

OWYHEE COUNTY.

(Special Correspondence.)—The Cumberland is one of the mines that closed down in this section when the Bank of California failed in September, 1875. Recently the district took on new life and considerable development work goes on. A new combination mill is being built at the Cumberland, on old War Eagle mountain. A 7000-foot tunnel is being run to drain the old workings and tap the ledges at lower depth. This district will be heard from in 1900.

Silver City, Dec. 31st, '99.

SHOSHONE COUNTY.

A report from the Charles Dickens is that the crosscut being run preparatory to sinking the new double compartment shaft has cut 10 feet of ore. A mill is in contemplation, as it is evident that with a small one the development work would pay its own running expenses.

The lower crosscut tunnel on the Leslie Copper M. Co.'s property has cut the vein, but instead of finding copper ore the ledge was filled with galena. In the upper works, 1000 feet farther west, there was good copper ore.

Spokesman-Review: Owing to the labor troubles in the Cœur d'Alenes, which culminated in the riot and destruction of the Bunker Hill & Sullivan concentrator, the output of the district will fall somewhat below that of last year, the product prior to April 29 having exceeded that of the same period last year, while since order was restored throughout the district each of the producing mines has materially increased its yield. The most marked increase is that of the Bunker Hill & Sullivan, which is turning out 1000 tons of ore daily, whereas the capacity of the old mill was only 700 tons. The total yield of the year is estimated at from 90,000 to 100,000 tons of shipping ore or concentrates sent to the smelters, as compared with 112,500 tons in 1898. There will be no material change in the grade of the ore shipped, although the opening of new bodies in the Last Chance, which run higher in silver and yield some copper, has probably caused a slight increase in the yield per ton. The Bunker Hill & Sullivan has also increased the comparative value of its ore slightly.

MICHIGAN.

HOUGHTON COUNTY.

New openings at the Isle Royale are showing well. The lode resembles the Quincy by being bunchy and rich. By carrying out its present policy of creating extensive openings the Isle Royale is preparing to become a large and steady producer. The hoist for No. 1 shaft has arrived. No. 2 hoist will arrive in January.

The Tamarack Co. has let the contract for the construction of the rock and shaft house for its No. 5 shaft, to be finished in September, 1900. This shaft will go into commission as a regular producer in 1901. It was commenced four years ago and will strike lode next fall at a depth of 4600

feet. No. 5 promises to be one of the greatest producing shafts in the district. To the east and in front of it the Calumet & Hecla found the lode very rich in its Red Jacket shaft. The conglomerate in this territory has been the richest upon the Calumet property and has been continuous from the surface in No. 4 shaft.

OUTANAGAN COUNTY.

The Mountain iron mine, on the Mesaba range, has finished a shipping season that broke all previous records for a single year's shipment from any iron mine. The shipments amounted to 1,139,000 tons of ore. The Fayal, on the Mesabra range, is the only other mine that shipped over 1,000,000 tons this year. Minnesota's total for the year was 8,368,034 tons, against 5,874,258 last year.

MISSOURI.

The following is given by the State Mine Inspector as the depth of mining shafts in the Missouri zinc fields:

Twenty-six per cent of all shafts operated were between 20 and 30 feet in depth.

Fifty-three per cent were between 100 and 150 feet.

Twenty-one per cent were between 150 and 225 feet.

The average depth of all shafts operated in the country is practically 120 feet.

MONTANA.

SILVER BOW COUNTY.

Alex Tarbet of Salt Lake is reported to have bought the Thomas claim in Butte for $31,000. The claim lies west of Alaska street, on Granite, and takes in the county courthouse. Very little surface ground belongs to the claim, all having been sold for town lots. The former owners, however, have claimed title to an alley running along the rear of two lots adjoining the courthouse, and upon that they have been sinking a shaft, but some time ago they were enjoined by the District Court because of damage done to the building by blasting.

Anaconda Standard: A suit for $600,000 damages has been brought in the District Court by the Boston & Montana M. Co. against the Montana Ore Purchasing Co. for ore taken out of that portion of the Pennsylvania claim which is involved in the suit which Judge Clancy recently decided in favor of the Montana Ore Purchasing Co. The new suit is a revival of a case which had originally been brought in the United States court, but was dismissed there. The complaint in the case alleges that the defendant entered upon the ground by means of underground workings and removed 150,000 tons of ore, valued at $600,000, between April 1, 1895, and April 6, 1898. It is alleged that the plaintiff did not discover the trespass until December 1, 1896. It has been stated that the decision of Judge Clancy did not give the Montana Ore Purchasing Co. the right to mine the property, because there is in force an injunction against the company, issued by the Supreme Court in another case. For several days notices have been published by both the Boston & Montana and Butte & Boston companies offering rewards of $2500 for information leading to the arrest and conviction of parties guilty of stealing or removing ore from either the Pennsylvania or Michael Davitt mines. The notices are the result of a discovery that some one has been stealthily taking out a large amount of the richest ore from both mines in those portions upon which injunctions have been issued. Recently a visit was made to the Pennsylvania mine by a representative of the Boston & Montana and seventy-five sacks of ore, running 30% and 40% copper, were found ready to be removed.

Butte Miner: During the past year the equipment of the Butte mines has kept pace with their development. Heavier and larger machinery has been installed at many mines, and engines capable of developing to a depth of 4000 feet have been placed in position. Several new steel gallows-frames have been erected, one at the High Ore, one at the Diamond and another at the Stewart. The managers of the big mines are planning to dispense entirely with the shafthouses, in order to guard against fire.

Another new feature in the Butte mines is a combination skip and cage, which works successfully. In some cases double-deck cages are used, sometimes with the skip on top and sometimes with the skip below. The former are used where the dump chute is above the collar of the shaft, and the latter where the dump is below the collar of the shaft. These skips have a capacity of eight tons each. The Boston & Montana and Parrot companies are contemplating putting in position new steel gallows-frames and skips.

Butte mining men are giving attention to ventilation, as many of the Butte mines have attained such a depth that the natural mode of ventilation will in the near future be found inadequate. A number of the big mines are connected, the air from one mine passing to the other, but this method of ventilation being no longer satisfactory mine managers are planning separate air shafts with fans on the surface.

The flashlight system of signaling is now in use in all the mines of the district.

Horses are used in nearly all the large mines of the district and are stabled underground.

NEVADA.

The gold production of Nevada in 1899 is estimated at $2,442,000, a falling off of $500,000 from the figure of the preceding year. The silver output partially makes up the deficiency, with a gain of $250,000, the estimated production being $1,254,800. The yield of lead and antimony is greater than for any previous year.

EUREKA COUNTY.

Eureka Sentinel: Men are at work in the Eureka Con. mine clearing out the seventh level and the incline from the ninth level some distance down. Work in both places will open up good ground in parts of the mine where no work has been done for many years. All the work done in this mine recently, in the way of opening up ground, has resulted in improving the output and prospects of the mine.

OREGON.

The output of gold for southern and eastern Oregon for 1899 is estimated at $3,285,000.

UNION COUNTY.

(Special Correspondence).—Mining property has advanced since the recent strike in the Brian mine, which sold at $30,000 cash. It is claimed that there is $200,000 in sight.

An explosion of giant powder took place at the Robert Emmet mine to-day; damage light; cause, thawing the powder at the stove. There were several boxes in the room at the time but only four sticks exploded.

The Union-Companion 20-stamp mill and thirty odd mines, the property of J. H. Searles of New York, is under bond at $750,000 and is being developed by a force of sixty men.

Cornucopia, Jan. 1.

UTAH.

The total mineral product of Utah for 1899 is estimated to be: Copper, 9,968,000 pounds; lead, unrefined, 90,062,000 pounds; fine silver, 7,736,248 ounces; fine gold, 173,266 ounces. Total valuation, $12,025,540.

Utah mines paid $1,934,750 in dividends in 1899. There are eighteen dividend payers which have paid an aggregate of over $33,000,000 in dividends since the organization of the companies. About 300 new mining companies were incorporated in Utah during the year, with an aggregate capitalization of over $100,000,000.

JUAB COUNTY.

The Centennial-Eureka, of Tintic distaict, is reported leading the shipping mines of that district in output of ore. They shipped twenty cars the last week of December.

SALT LAKE COUNTY.

Salt Lake Tribune: The receipts of dust from the cyanide mills at the gold sampling rooms of the Con. Kansas City Smelting & Refining Co. during the year 1899 reached a total of 100,000 pounds, of the value of $1,713,600. From this volume of dust there was obtained 100,000 ounces of silver, of the value of $60,000, and 80,000 ounces of gold, of the value of $1,653,600.——Of the total receipts Mercur, Sunshine, West Dip and Lion Hill, in what is known as Mercur district, produced 85,000 pounds of dust, containing 60,000 ounces silver, valued at $36,000, and 65,000 ounces gold, of the value of $1,343,550, with a total of $1,379,550. In this total is included the output of the Golden Gate or De La Mar's Mercur mines for but seven months in 1899, the product during the remainder of the year having been reduced to bullion at the owner's independent refinery and gone into the volume of gold at large.

TOOELE COUNTY.

At J. R. De La Mar's Mercur mines, consisting of the Golden Gate group and others at Mercur, during the year four tanks were added to the leaching department, increasing the set to a total of twenty-six, each with a capacity of 225 tons, or a total of 6600 tons per month. During the same period three new furnaces have been added to the roasting plant. The refinery has undergone a complete change, the new method of refining introduced by Mr. Jackling overcoming all danger. This has been in operation since last July and has given satisfaction. In the mine there has been a large amount of development under Duncan McVichie, general superintendent, so that at this time it can furnish 1000 tons of ore daily. The output is through a shaft and incline combined. For 300 feet the shaft is vertical, then from its bottom to the point at which the incline begins. This shaft and incline is divided into three compartments, in two of which "skips," with a capacity of three tons each, are run in balance. The third compartment is used to handle timber and other supplies and as an exit for the men. The mine is operated on two shifts of eight hours each, and in sixteen hours over 1100 tons of ore have been raised to the surface.

The old Dragon iron mine is now operated and known as the Tintic iron. During the past year shipments were made aggregating 16,000 tons. The ore averages 51% iron excess, and mostly all of it has been used by the local smelters for flux. Several shipments were made outside of the State for the same purpose. The property has been bonded to Thomas Weir, and the latter part of May he began grading a road and getting ready to sink a shaft. The iron ore is taken from open quarries, which have reached over 100 feet in depth and have an area of over 100 by 200 feet. The shaft was started some distance from this quarry, and crosscuts will run from the shaft under the old works. This mine has been yielding an average of 10,000 tons of fluxing material for the past score of years or more.

SOUTH DAKOTA.

CUSTER COUNTY.

Another strike is reported in the Holy Terror mine near Keystone. With a 6-inch vein to commence with at the surface, whose average value was $29 in gold to the ton, it has grown to a 12-foot ledge, with an average value of $35 to the ton.

LAWRENCE COUNTY.

The Golden Reward Co., at Deadwood, are to add a refinery to their extensive plant—the Deadwood & Delaware Smelter, recently bought by them. The Oro Fino mine, in Strawberry gulch, which produces auriferous iron-sulphide ores, is to be reopened, and the Golden Reward Co. will develop their properties in Bear Butte and South Ruby districts. The Golden Reward Co. is now the second largest concern operating in the Black Hills, the Homestake Co. taking the lead.

WASHINGTON.

One hundred and seventy-one sacks of ore concentrates were brought to Tacoma this week from the mines near Singapore, in the straits settlement, for treatment in the Tacoma smelter, the first shipment of ore from the Orient to an American smelter. The product of these mines has been sent to England and this is a trial order.

STEVENS COUNTY.

(Special Correspondence).—A strike in the Lone Pine, of the Lone Pine-Surprise Con. Co., a north and south ledge, 5 to 8 feet wide, average value $22.48 so far as explored, is in soft milk-white quartz, and unlike any ledge in the vicinity. It was on this ledge that the high surface values were obtained two years ago, ranging $60 to $300.

The ledge of blue quartz crosscut by the drift from the 200-foot level on the Chico is of low grade where cut, but of fine appearance. Mgr. Aspinwall has gone to San Francisco to get a compressor plant to drift on the ledge.

There is a strike in the Belcher property, twelve miles east of Republic Camp, the winze sunk near the face of the tunnel at a depth of 85 feet, cutting into 4 feet of copper-gold ore.

Considerable work is starting lately on several different properties on Bridge creek on the south half of the reservation.

The Republic mine paid its thirteenth dividend of 1c per share last month, making a total of $565,000. While the old mill is being run experimentally ore shipments are being made to Trail Smelter, via Grand Forks, the wagon haul now being 30 miles.

Republic, Jan. 1st.

WYOMING.

The mineral production of Wyoming for 1899 was $6,091,763, as follows: Gold, $1,003,101; coal, $4,659,156; copper, $265,960; iron, $114,000; silver, $309,456. Of the gold the Carissa mine at South Pass, and owned by Salt Lake men, produced nearly $900,000. Of the copper the Ferris Haggarty produced $149,364 and the Rambler $55,000.

CARBON COUNTY.

The Battle Lake Copper Exploration Co. is installing a plant of machinery on its mine at Battle Lake and will push development work. This company owns a number of copper properties in Battle Lake district. Part of the claims are near the Haggarty and Doane groups, which are the largest producers of the district. A shaft 400 deep will be sunk near the Mayflower group, where the surface showing is good.

On the Newsboy claim 4 feet of ore running 25% copper has been found. The mine is four miles east of Grand Encampment. The vein has proven to be continuous by a number of shallow cuts along its length.

FREMONT COUNTY.

(Special Correspondence).—The old Carissa mine of this place, which has been a producer for thirty years, is being developed by air drills. It has large bodies of fair-grade ore in three levels and stopes. The shaft is being sunk to open a fourth level. This mine is equipped with a 10-stamp mill, two 60 H. P. boilers, 60 H. P. Corliss engine, three concentrators, electric plant, compressor and air drills, the most complete plant in the State, and is a paying proposition, owned by Chicago parties.

South Pass, Dec. 26th, '99.

FOREIGN.

AUSTRALIA.

During the first ten months of 1899 the gold production of Victoria was 681,366 ounces. The total production of that province since 1851 is stated to be £253,464,284.

The occurrences of cinnabar has recently been attracting attention in New South Wales, Queensland, Victoria and New Zealand. The last reported discovery is that of a lode in the Waitahuna ranges, twelve miles from Berwick and half-way between that place and Waipori. Small pieces of cinnabar have frequently been picked up on the river bank, and, in consequence, a number of prospectors have been engaged for several weeks looking for the main lode, which has been found. It is 16 inches wide. Cinnabar, nearly pure, occurs 3 inches thick on the hanging wall.

BRITISH COLUMBIA.

W. Hall, manager of the Iron Mask mine, at Rossland, recently testified that he also had had charge of three mines at Republic camp, where the wages were $3.50 for ten-hour shifts, and that he had managed the Iron Mask under both systems—the ten-hour and eight-hour shifts—and there was little or no difference in the work attained under either system. They made an average of 15 feet per week with two shifts in all the workings under the old law, and 14.87 feet under the present law. In drifting, from 15 to 22 feet per week was accomplished under both systems. It cost more under the eight-hour, as they were obliged to employ three more laborers at $2.50 per day to keep the ore sorters busy. They could employ more drills with the same staff as they now had, but a time would come when they would require to again increase the laborers in proportion, and so on from time to time the increase would be necessary. The ore in the Iron Mask and Le Roi was identical. Fifteen feet of drifting a week is about the average of the camp.

It is reported that W. R. Peck of New York has been in Vancouver, in the employ of John W. Mackay, looking after mining deals. He made payments on several properties on Frederick's Arm, 100 miles up the coast from Vancouver, the total amount being $90,000. It is also said that Peck had an interest in the purchase for $150,000 of a property known as the Boscowitz mine. He also visited several of the copper properties on Texada island, including the Van Anda, owned by H. W. Treat of New York. A smelter was erected some time ago on this property and is being enlarged.

Frank Robbins, general manager for Mackenzie & Mann, at Phœnix, reports work making good progress in the Brooklyn and Stemwinder mines. He reports a strike in the North Star, one of the mines owned by Mackenzie & Mann, near Cranbrook, East Kootenay, for which he is consulting engineer. Nine feet of clean galena was found by Frank Parker, superintendent of the mine, 210 feet south of the mouth of the 60-foot tunnel, and 150 feet down the hill from the old 20-foot stopes. It is thought to be a continuation of the main ore body of the mine. This is the most important find that has been made in the mine in the past two years.

The mines of Ymir are located on fissure veins, carrying principally gold values, with small amounts of silver, lead, zinc and iron, the zinc or iron having no commercial value. In the Ymir group the best gold values are in the galena ores, which in stamp mills yield from 50% to 60% of their gold values on the plate. The Ymir mine is operated by the Ymir Gold Mines, Ltd., London. The ledge is 6 feet wide on the surface and 35 feet at a depth of 300 feet. The ore is principally galena. The company has a forty-stamp mill, with a capacity of 120 tons a day, and are putting in forty more. They employ 100 men. It is reported that the question of wages has been settled.

The richest lot of ore ever shipped from Rossland was sent out from the I X L to the Trail smelter recently. It consisted of half a ton of high-grade, free-milling ore, the assay of which was nearly $2400 per ton. The carload of twenty-two tons shipped last week ran about $35 per ton.

Another carload of high-grade ore has been prepared for shipment. Drifting has been started in other directions in the ledge struck on the third level, and a station is being cut to start a raise on the second level.

The Department of Mines of the Government of British Columbia has forwarded seventy-one cases of nuggets and gold dust for exhibition in the provincial section at the Paris Exposition. The gold is representative of all British Columbia's creeks.

CHINA.

U. S. Consul Smithers, of Chuogking, in a late report says: "The usual manner of getting ore in Yunnan has been to follow a lode from the surface into the ground as long as possible, without going to the expense of sinking a shaft or driving profitless tunnels. The miners have usually been left to do as they pleased under ground, as the Government officials and private capitalists have considered it beneath their dignity to explore the caverns dug at their expense or under their orders. The miners, in most instances, have been very badly treated, both by official overseers and private capitalists, and have taken their revenge on their employers by deceiving them to such an extent as to ruin them. Their mode of operation in this respect has usually been to expend all the available capital in getting very poor ore—in some cases no ore at all—and leaving columns of the best-paying ore standing in various parts of the underground working, easily accessible whenever it was desired. In this manner, the miners have almost invariably succeeded in exhausting the resources, as well as the patience of the officials and capitalists, with the result that they have been forced to abandon the mines as unprofitable investments, and the miners were disbanded and driven away without pay. After enduring suffering quietly for a time, the miners managed to repay themselves for their former trouble by extracting in a quiet way the ore they had left in the mines and selling it to petty local manufacturers or themselves coining money, sometimes of superior weight and quality to the legal Government issue."

MEXICO.

For 1899 it is reported that Mexico's export of metals, including the precious metals and their ores, will reach a value of $60,000,000.

It is reported that at Tepic considerable mining property has been changing hands; a railroad will be built from Port San Blas to Ixtlan; a million dollar smelter is to be built, and altogether $5,000,000 in gold will be invested there in the next year.

NEW SOUTH WALES.

The gold yield for 1899 in New Sonth Wales was 509,418 ounces, an increase of 168,925 ounces over 1898.

NEW ZEALAND.

New Zealand's export of gold is $2,000,000 greater than last year.

TASMANIA.

An unusual accident recently occurred at the Mount Lyell mine. The mine is worked by a series of benches in a large cut. Deep holes are put down in series and "sprung" with a small quantity of nitro powder before the full charge is put in. The men at work were warned as usual when about to blast and those working near retired to a short distance to avoid rocks which might fly from the collar to the hole. The powder blew out the bottom of holes and a number of men were injured.

The value of the minerals exported from Tasmania during November amounts to $800,000, one-third more than in the corresponding month of last year.

Personal.

W. G. SCOTT has been reappointed Supt. Mt. Shasta mine, Shasta, Cal.

B. H. TOMKIN of San Francisco is examining mining properties in Shasta county, Cal.

HOWARD FIELDING, Denver representative of Warren Webster & Co., spent the holidays in Chicago.

CHAS. A. REED has resigned the superintendency of the Bellvue mine, near Ophir, Placer county, Cal.

M. L. REQUA has returned to San Francisco from an inspection of his recently acquired mines in Arizona.

T. C. HOPKINS has been elected a director of the Cochite G. M. Co. and Vice-Pres. Navajo G. M. Co.

A. E. LINDROOTH, Denver agent of the Link Belt Machinery Co., recently made a business trip to the home office at Chicago.

T. C. JAMES AND THOS. NICHOLS of Shasta county, Cal., go this week to San Salvador, C. A., to operate a cyanide plant.

J. C. NICHOLS, Grand Junction, Colo., goes to China as mining and consulting engineer for a Chinese and English mining corporation.

ROY D. HUNTER, representing the Sullivan Machinery Co. at Denver, Colo., visited the company's headquarters in Chicago last week.

G. F. MILLIKEN, late of New York City, will superintend the future operations in the Uncle Sam G. M. Co.'s property, Shasta county, Cal.

WM. STANTON of South Milwaukee, Wis., is supervising the building of a steam mining dredge near Folsom, Cal., to operate on the American river.

O. H. PACKER has returned to San Francisco from Durango, Mexico, where he had been examining a mining property for a San Rafael, Cal., lumber firm.

CHAS. S. FORD is building a 20-stamp mill for the Young America G. M. Co. at Tuscarora, Nevada. The mill is at the shaft, on level ground, the ore being hoisted 65 feet to allow gravity action through the mill.

W. H. STORMS, who, since Feb. 20th, '99, has held the editorial chair of the MINING AND SCIENTIFIC PRESS, has been appointed by Gov. Gage to make an examination of the mines of the gold belt of California for the State Mining Bureau. Mr. Storms formerly was an assistant in the field in connection with the Mining Bureau, serving from April, '92, to Sept., '96, and is familiar with the work he has been selected to perform.

Industrial Notes.

—San Francisco has voted to spend $9,000,000 in municipal improvements.

—The wages of 25,000 men in Pittsburg were advanced from 5% to 10% this week.

—A complete telephone system is now in operation among the mines in the vicinity of Wallace, Idaho.

—The Washington Red Cedar Shingle Manufacturers' Association will be continued during 1900.

—The Great Northern Ry. Co. will sell stock to its employes at par, the amount in each individual case to be limited to $5000.

—A Pullman sleeping car is now running through from Kansas City to Mexico City, a distance of 2,300 miles, via the Mexican Central.

—San Francisco, Cal., has 16,475 telephone subscribers—the largest number, proportionate to the population, of any city in the world, except Stockholm.

—Ottawa will incorporate the Fort Simpson, Teslin & Dawson Railway Company, for a railroad from a point on the Pacific coast near Fort Simpson to Dawson City, via Teslin lake.

—Besides the extensive piping system to be put in at Cape Nome, that northern Mecca is promised a $150,000 floating wharf, to be constructed between rows of piles driven out to a distance of 4000 feet from the beach.

—A railroad is projected from Ione, Cal., to Jackson and Plymouth via Sutter Creek, Amador City and Drytown, a distance of thirty-five miles, by the Jackson, Sutter & Amador Railway Co. Capital stock, $2,100,000.

—The Coast and Geodetic Survey reports finishing the inland boundary line between California and Nevada from Lake Tahoe to the Colorado river, a distance of 400 miles, extending over the White mountains, through Death valley and the desert.

—At the Union Iron Works, San Francisco, shipyard lies a 13-inch rifled gun for the battleship Wisconsin, now approaching completion. The cannon is 40 feet long, weighs 70 tons and will throw a projectile ten miles. The Wisconsin will have four of these, the largest guns ever put on an American battleship.

—The following table shows the growth of railroad lines in the Pacific States:

State or Ter—	1870.	1880.	1890.	1898.
Washington	...	289	2,012	2,809
Oregon	159	508	1,439	1,615
California	925	2,195	4,349	5,292
Nevada	593	739	923	920
Idaho	...	206	946	1,118
Arizona	...	349	1,094	1,416
Utah	257	842	1,265	1,479
Totals	1,934	5,128	12,025	14,649

—A water-driven electric plant is proposed in Brazil to obtain 16,000 H. P. from the Tiete river and transmit it electrically to the city of San Paulo, twenty-four miles distant. A masonry dam 1000 feet long and 35 feet high will be built, and the water will be conducted by a steel conduit 12 feet in diameter and a half mile long to the turbines. The electric transmission is to be at 20,000 volts, three-phase, and the current will be used by a company which owns 104 miles of street railway in San Paulo.

—The Chicago drainage canal was opened with appropriate ceremonies on the 22nd ult. This great artificial waterway, which has been described and illustrated in these columns several times, has cost about $30,000,000, is 33 miles long, 300 feet wide, 36 feet deep, and connects the Great Lakes with the Mississippi river for navigation purposes, besides draining the city of Chicago.

—A stove manufactory sends the following which tersely shows the existing situation in the lines it discusses: Since the last advance in prices of stoves there has been a continual increase in the cost of all materials, including about $5 per ton on pig iron, and corresponding advances on other raw materials. There has also been a shortening of terms on most of the staples to thirty days, with either 1% or no discount for cash. Materials we use largely have advanced since last summer as follows:

Materials.	Per cent.
Pig iron	125
Copper	81
Wire	132
Lumber	87
Pipe fittings	111
Oils	100
Steel	100
Tin plate	78
Nails	170
Bolts	111
Pipe	184
Rivets	110

These advances in stove materials average over 100%. There seems to be no possibility of reductions for some time to come; therefore we find it necessary at this time to make another advance of 5% in the price of stoves, and the changing of terms to those usual in other lines of trade, viz: Sixty days, 2% discount for cash, ten days.

—In his annual coal and pig iron report for 1899, J. W. Harrison says: It is singular to report a smaller consumption of coal this year than last, in view of the large quantity delivered to the Government transports, and the general belief here that every branch of trade is brisk, which invariably leads to a large fuel demand. The consumption of oil as a steam producer is being enlarged monthly, but its benefit as an economical adjunct to our industrials will be neutralized, as its market value is about to be established by the usual "commercial cancer"—a combination or trust. With recent discoveries of oil over a large section of our State, and its low cost of production, it was supposed that our most serious setback, viz., low-priced fuel, had been overcome, but the pooling of issues now being discussed means advantage to the few and detriment to the consumers. The various sources from which we have derived our supplies are as follows:

	1899. Tons.
British Columbia	623,133
Australia	139,333
English and Welsh	93,263
Scotch	None.
Eastern (Cumberland and Anthracite)	39,951
Seattle (Washington)	271,694
Tacoma (Washington)	355,756
Mount Diablo, Coos Bay and Tesla	189,507
Japan, and Rocky Mountains by rail	28,390
Total	1,740,027

The total amount of coke received amounts to 31,091 tons, against 41,630 tons received last year. Three-fourths of the coke consumed here is imported from England and Belgium. The ovens at Comox, British Columbia, are now in full blast, as they propose shipping all their surplus to this market in 1900. They make a very fair grade there. The total deliveries of pig iron aggregate 6593 tons—of this 952 tons are English, remainder is American. The imports last year were 11,180 tons, which intimates a large shrinkage this year and a large falling off in orders for structural and mining purposes. The high prices now ruling will naturally diminish consumption. But little scrap iron is now imported; only 198 tons of foreign arrived. The fuel problem is a most serious one to solve in California, and is today in a most sensitive position. Our yards are comparatively empty; there are only three or four collieries on the Coast of any magnitude whence we may derive supplies; hence, if a strike, lockout or any accident should occur in any one of these, the consequences locally would be most disastrous. It is a perilous position to occupy; the tension is too great.

Commercial Paragraphs.

THE Taylor & Brunton Ore Sampling Co. now have offices in the Boston Bldg., Denver, Colo.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING DEC. 26, 1899.

640,158.—WEIGHING SCALE—J. S. Cox, Escondido, Cal.
639,714.—THILL COUPLING—B. D. Crawford, Salem, Or.
640,109.—BRIQUETTE PRESS—J. T. Davis, S. F.
640,116.—SAIL—J. Duthie, Portland, Or.
639,172.—SAW SET—F. Hanna, Santa Ana, Cal.
640,133.—KEY FASTENER—Hazeltine & Dodd, Los Angeles, Cal.
640,136.—SOLDERING MACHINE—R. D. Hume, Gold Beach, Cal.
639,855.—SEPARATOR—R. W. Jessup, S. F.
639,899.—CAR COUPLING—A. Keusink, Tacoma, Wash.
639,856.—BOTTLE STOPPER—H. A. Knight, Alameda, Cal.
640,142.—GAS GENERATOR—W. F. Love, Spokane, Wash.
639,858.—IRRIGATING PIPES—Martin & Ormand, Riverside, Cal.
639,756.—RAISIN SEEDER—W. M. McConnaughay, Fresno, Cal.
640,023.—AIR PUMP—P. B. Perkins, Los Angeles, Cal.
639,766.—GOLD SAVING DEVICE—L. E. Porter, Los Angeles, Cal.
639,906.—FRUIT GRADER—R. M. Pratt, St. Helena, Cal.
640,034.—CANNING MACHINE—O. Rubarts, Newport, Or.
639,911.—BUTTER CUTTER—R. A. Simpson, Ferndale, Cal.
639,871.—RAISIN SEEDER—Snyder & Hansen, Fresno, Cal.
640,043.—CURTAIN PIN—S. F. Stenner, Portland, Or.
639,835.—SAWMILL CARRIAGE—A. J. West, Aberdeen, Wash.
640,062.—CIRCUIT BREAKER—E. F. Winfield, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BOTTLE STOPPER.—H. A. Knight, Alameda, Cal. No. 639,856. Dated Dec. 26, 1899. This invention relates to a faucet which is especially designed to be used in connection with bottles containing soda water or other effervescent liquid which it may be desired to partially draw off without destroying the value of the remainder by allowing the gas to escape. One portion of the stopper extends into the neck of the bottle and the other exterior thereto, and is provided with a surrounding flange. Spring clamps each have one end secured to the bottle neck and the opposite end free and adapted to spring over the flange of the stopper and hold it in place. An elastic clamp embraces the two clamps which are secured to the bottle neck at a point between the ends to hold them in place. A slidable cap is fitted on to the stopper portion and has a discharge nozzle, so that, when it is pressed inward, a valve which is carried by the cap will be opened to allow the liquid to escape. When released, the pressure forces the cap outwardly, and a spring closes the valve at the same time.

CORSET STAYS.—Mary E. Thompson, San Francisco, Cal. No. 639,463. Dated Dec. 19, 1899. This invention relates to a device for interlocking and securing the edges of clothing, wearing apparel and the like. It consists of metallic hooks and loops formed upon the edges of the meeting plates, the loops having perforations to receive the hooks and having the edges turned over so as to partially enclose the points of the hooks after the two have been engaged. These turned over portions may also have holes or slots made in them to completely lock the points of the hooks and prevent their being accidentally disengaged.

Recently Declared Mining Dividends.

Cloverdale Zinc M. Co., Joplin, Mo., quarterly dividend, 2%; payable Jan. 10.

Bunker Hill & Sullivan M. & C. Co., Wardner, Idaho, $21,000; Jan. 4.

Empire State-Idaho M. & D. Co., 3%; payable Jan. 15.

Arizona Eastern & Montana Smelting Co., 2%; payable Jan. 10.

Grass Valley Exploration Co., California, regular quarterly, 25 cents per share; payable Jan. 20.

Latest Market Reports.

SAN FRANCISCO, Jan. 4, 1900.

SILVER—Per oz., Troy: London, 27d (standard ounce, 925 fine); New York, bar silver, 58¾ cts. (1000 fine); San Francisco, 58¾; Mexican dollars, 47¼c.

The statement issued by the Director of the Mint shows that the total coinage executed at the mints of the United States during the calendar year ended December 30, 1899, was $139,243,191, as follows:

Gold, $111,344,220.
Silver, $26,061,519.
Minor coins, $1,837,451.

The coinage executed during December amounted to $9,711,884, as follows:

Gold, $7,469,952.
Silver, $1,886,605.
Minor coins, $355,327.

The quarterly statement of the value of foreign coins issued by the Director of the Mint shows that during the last three months the value of silver has decreased .118 cent per ounce and the value of foreign silver coins has decreased accordingly. These figures will be followed in estimating the value of all foreign merchandise exported to the United States on and after January 1, 1900.

Some $7,000,000 or $8,000,000 may be considered as a fair estimate of the number of Mexican dollars circulating in the Philippines at this period. Besides this, a large number of half dollars were exported for use in Morocco, presumably to pay part of that country's indemnity to Spain, until legislation put an end to the business. On the arrival of the Americans a large amount of United States gold was brought by the military. Some difficulty was experienced in the beginning, as the natives and Chinamen did not know the values. The exchange of United States gold or silver to the Philippine or Mexican silver is commonly accepted at $1 United States for $2 Mexican or Philippine; but the exchange varies at the banks and large commercial houses, according to the value of the Mexican dollar in London and San Francisco. Mexican dollars, irrespective of dates, have been recently imported through the banks in large quantities. There is a shortage of subsidiary coinage, no fraction of the Mexican silver dollar having ever been in circulation.

COPPER.—New York Lake, $16.25; electrolytic, $16.00; casting, $16.12½; St. Louis, $16@16.25; San Francisco, 17½@18. Mill Copper plates, 23¾c; bars, 25½@27c.

LEAD.—New York, $4.70; St. Louis, $4.55; San Francisco, $4.55; pipe 7½, sheet 8¾, bar 6¼c. London, Spanish Lead £16 7s 6d=4.55½c per lb.

SPELTER.—New York, $4.55; St. Louis, $4.50; San Francisco, ton lots, 5¾c; 100-lb lots, 6¼c.

ANTIMONY.—New York, 9¼c; San Francisco, 1000-lb lots, 10c; 300 to 500 lbs., 11@14c; 100-lb lots, 15@18c.

BABBITT METAL.—San Francisco, No. 3, 6¼@8c.

IRON.—Pittsburg, American soft, $25.25; Scotch, $26.50; San Francisco, bar, per lb., 3¼c.

STEEL.—San Francisco, bar, 11½@20c per lb.

QUICKSILVER.—New York, $52.00; London, £9 13s; San Francisco, local, $51.50 ₱ flask of 76½ lbs.; export, $47.

PLATINUM.—San Francisco, crude, $14 ₱ oz.; manufactured, $19@22.

FERRO-MANGANESE.—San Francisco, ₱ ton, $30.

ZINC.—San Francisco, 53½; slab, 6½c; bar, 8.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb.

TIN.—New York, pig, $26; San Francisco, $29; bar tin, ₱ lb, 35c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c.

NICKEL.—New York, 40@45c ₱ lb.

FERRO-TUNGSTEN.—New York, 60c; San Francisco, 75c (60%).

CANDLES.—Granite 6s, 16 oz. 9½c; 14 oz., 8½c; 12 oz., 7½c; 10 oz., 6½c.

POWDER. F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

COAL.—San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, bd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs' $10.05; Colorado Anthracite, $14.50.

San Francisco Stock Board Sales.

SAN FRANCISCO, Jan. 4, 1900.

9:30 A. M. SESSION.

300 Alta	4c	400 Mexican	30c
500 Belcher	10c	100 Potosi	21c
100 Chollar	18c	100 Savage	9c
100 C. C. & V.	$1 40	300 Utah	4c
100 Crown P't.	12c		

2:30 P. M. SESSION.

600 Ophir	69c	200 Alpha	3c
100 Mexican	30c	50 Belcher	13c
500 Mexican	31c	100 Sierra Nev.	41c
300 B. & B.	23c	100 Overman	11c
100 C. C. & V.	$1 45	200 Union	26c
100 Chollar	18c	100 Caledonia	43c
100 Crown P't.	13c	50 Challenge	12c

SITUATIONS WANTED.

Experienced Metallurgist and Cyanide Expert desires position. Thorough chemist and assayer. Technical graduate. Speaks Spanish. Capable of taking full charge of gold mill. Salary very reasonable. Address "Millman," this office.

WANTED, A POSITION AS ASSAYER.
Can give good references. Address D. H. A., care this paper.

MINING ENGINEER WANTS POSITION.
Is a good chemist and metallurgist with thorough practical experience in stamp milling, cyaniding and chlorinating. Recently had charge of stamp mill and cyanide works. Has had excellent experience in examining and reporting on mines, chiefly gold. Speaks Spanish, also French and German; age 30. Moderate salary accepted. Address DENVER, Mining and Scientific Press.

Position Wanted
By Experienced Metallurgist and Mining Engineer, preferable in charge of a cyanide plant or as chemist and assayer. Thoroughly familiar with all processes for gold extraction. Technical graduate. Best of references. Salary moderate. Address W. C. A., care this paper.

WANTED.

Wanted.—Foreman for Twenty-Stamp Mill.
One hundred and fifty dollars per month and board. Address THE WM. HAMILTON MFG. CO., 316 S. Euclid Ave., Oak Park, Illinois.

WANTED.—A STAMP MILL MILLWRIGHT.
Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

WANTED IMMEDIATELY
A Thoroughly Competent Stationary Engineer to take charge of Steam Power Plant at Keswick Smelters.
Apply, stating terms and references, to the manager. THE MOUNTAIN COPPER CO., Keswick, Shasta Co., Cal.

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Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

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For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.
For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

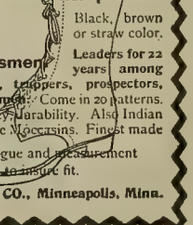
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OF SAN FRANCISCO.
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Assessment Notices.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras county, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of November, 1899, an assessment (No. 3) of ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of January, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 20th day of February, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post Street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of December, 1899, an assessment (No. 22) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 27th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

SAVAGE MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 8th day of December, 1899, an assessment (No. 99) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 30th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

E. B. HOLMES, Secretary.

Office—Room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

SOUTH PALOMA GOLD MINING COMPANY, Limited.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Directors, held on the 6th day of December, 1899, an assessment (No. 1) of six-tenths (6-10) of a cent per share was levied upon the capital stock of the corporation, payable immediately to the secretary, John F. Barnett, at Room 22, No. 222 Sansome St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3rd day of February, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on the 19th day of February, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

JOHN F. BARNETT, Secretary.

Room 22, No. 222 Sansome St., San Francisco, Cal.

QUINCY MINING AND WATER COMPANY.—Location of principal place of business, San Francisco, California; location of works, Spanish Ranch, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of January, 1900, an assessment (No. 2) of forty cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 439 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of February, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 5th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

THOMAS QUIGLEY, Secretary.

Office—No. 439 California street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of January, 1900, an assessment (No. 10) of five cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of February, 1900, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 5th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

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Principals only, desiring to purchase a developed, working, valuable copper mine and smelting works, address OWNER, care of Mining and Scitific Press, San Francisco.

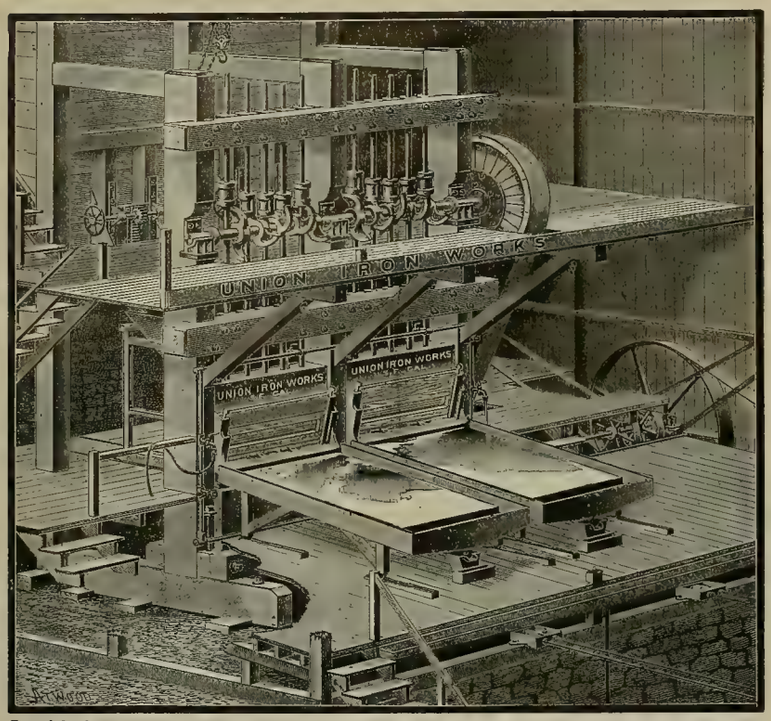
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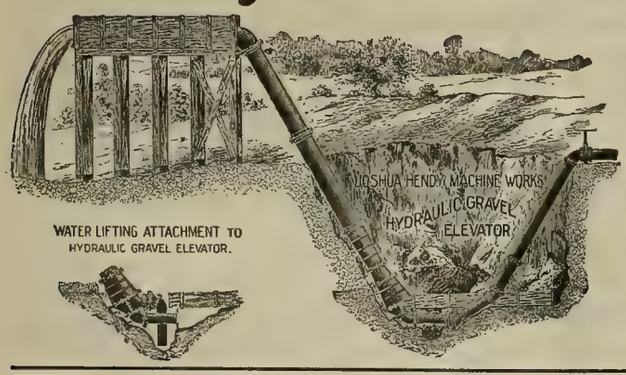
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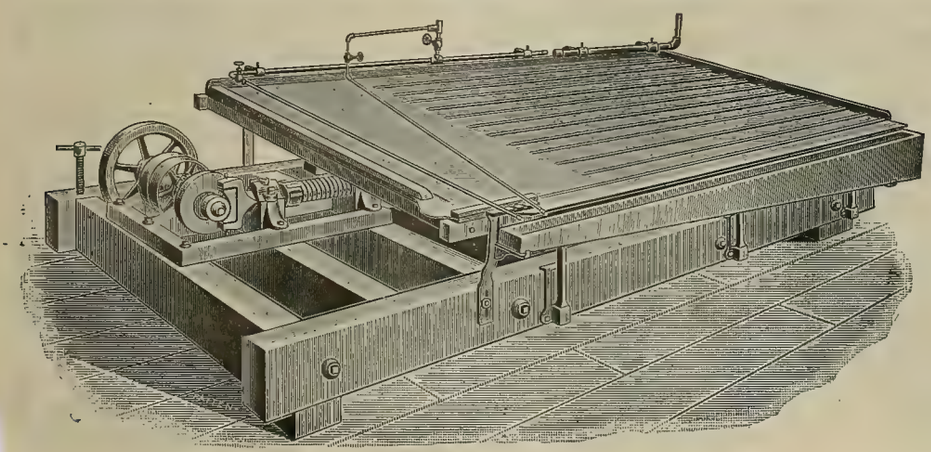


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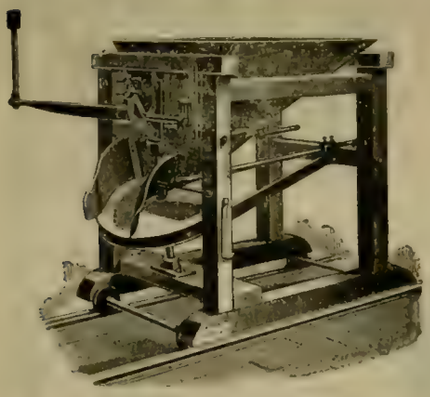
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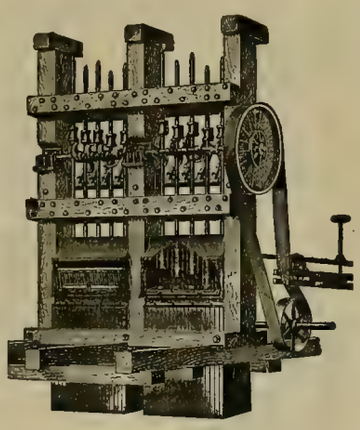
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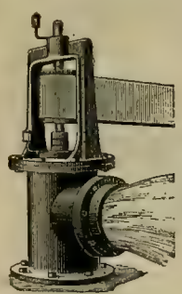
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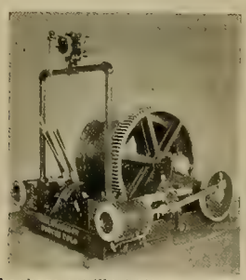


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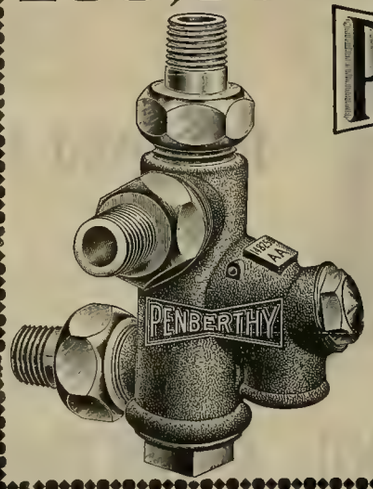
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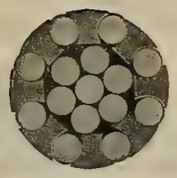
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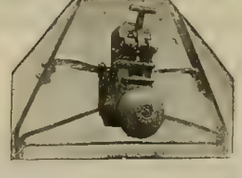
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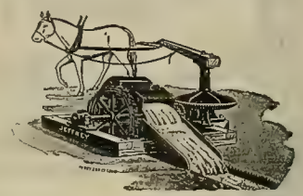
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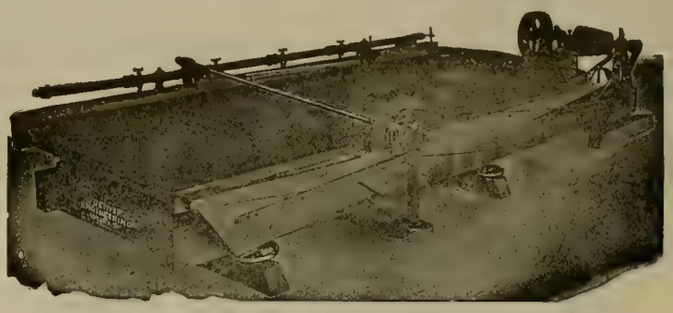
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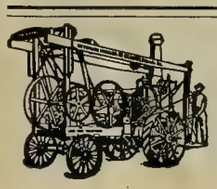
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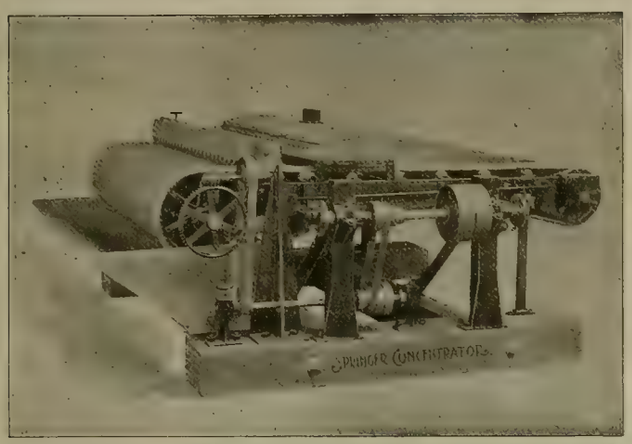
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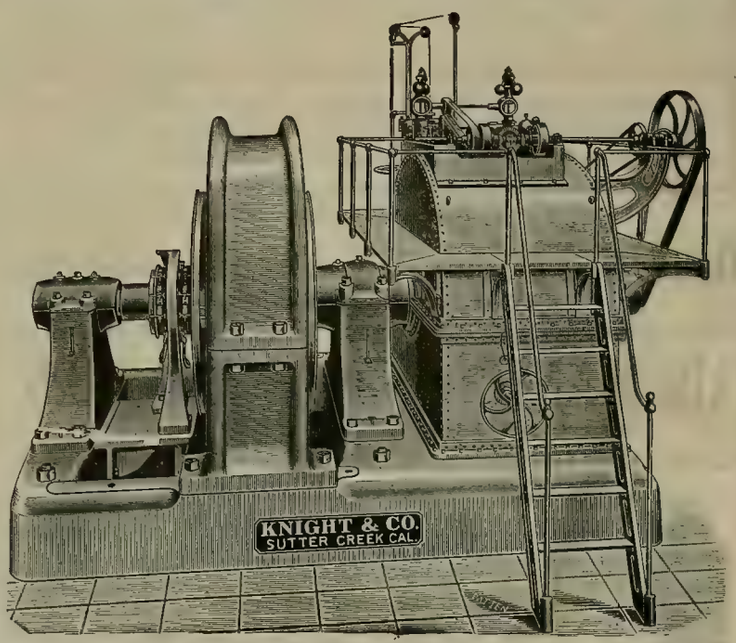
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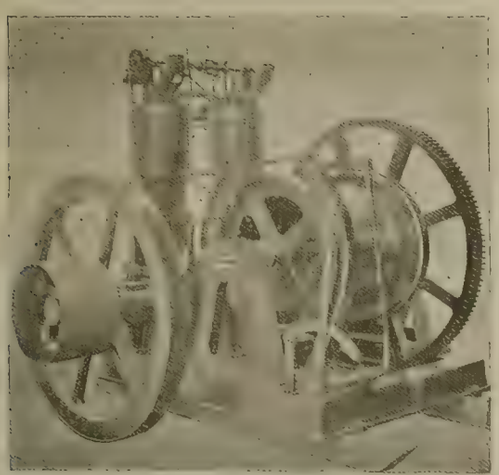
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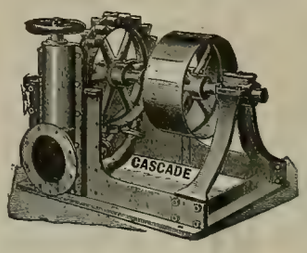
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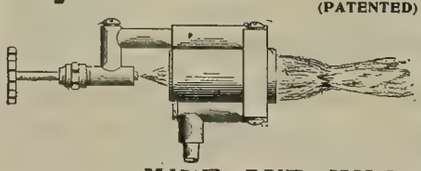
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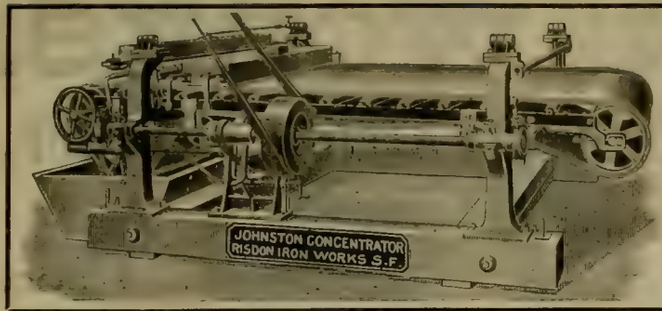
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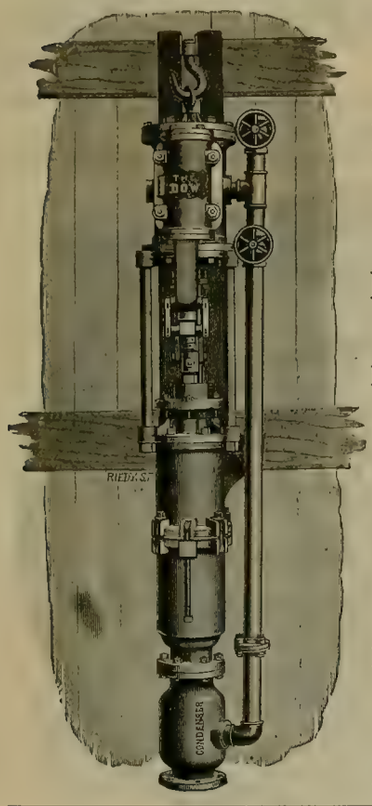
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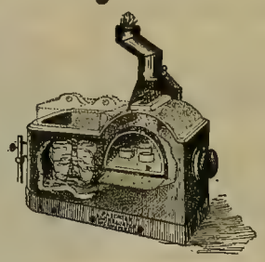
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(Shown in illustration)

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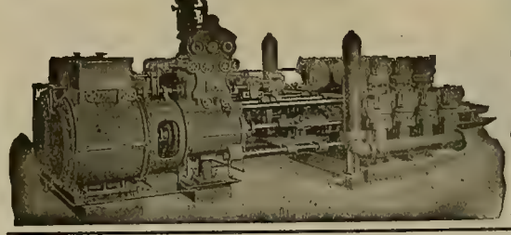
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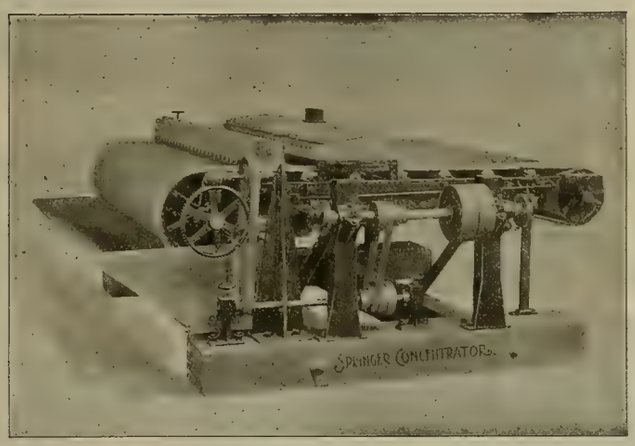
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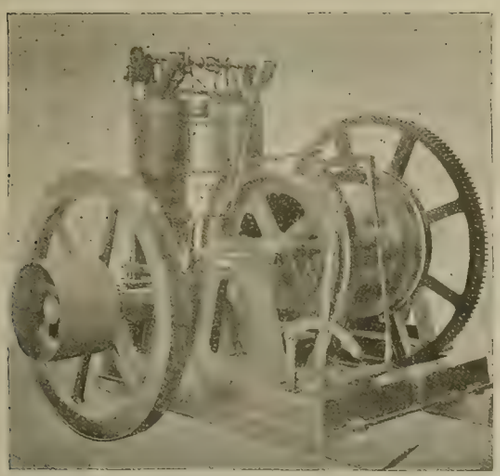
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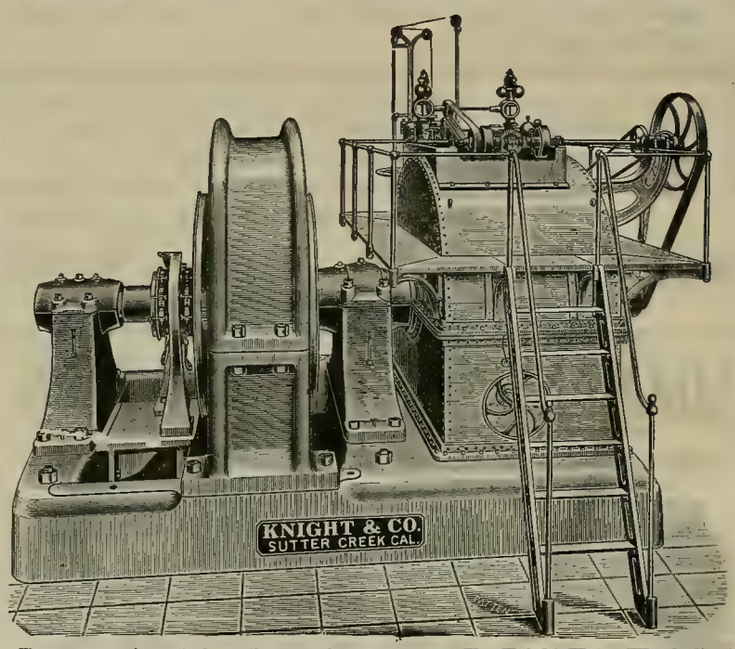
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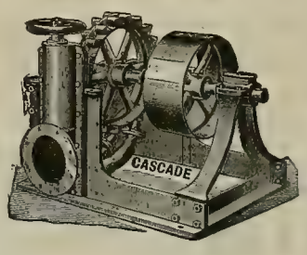
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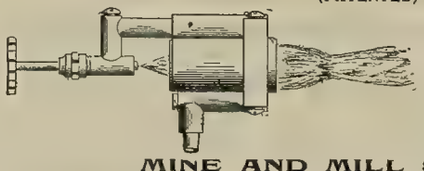
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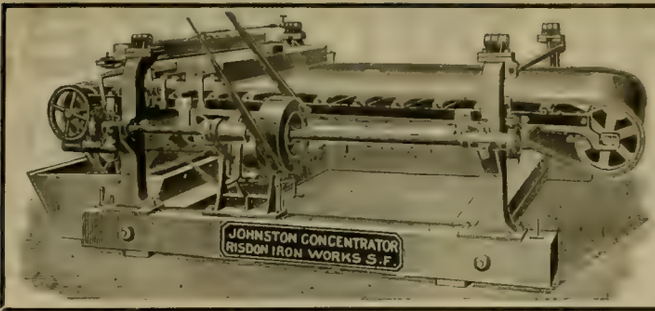
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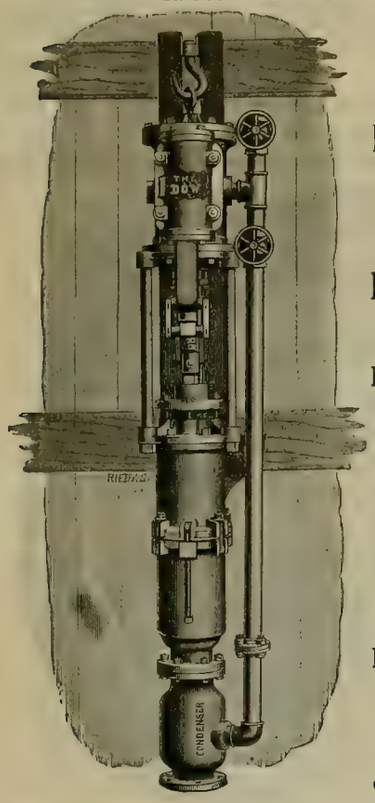
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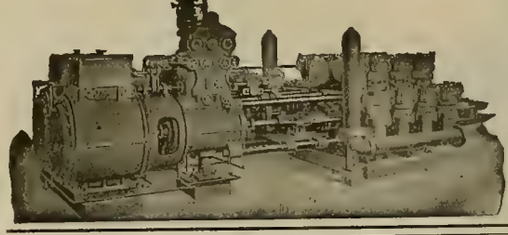
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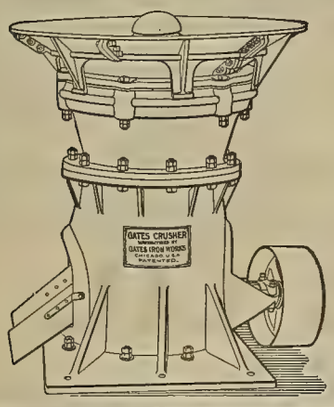


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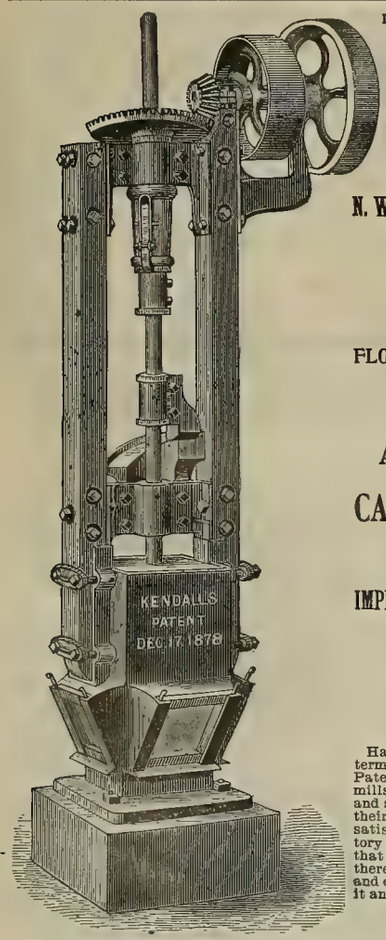


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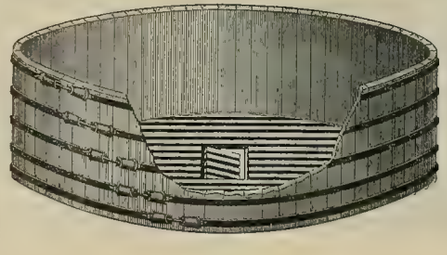
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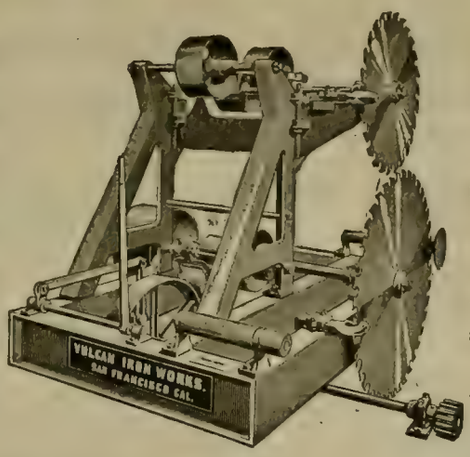
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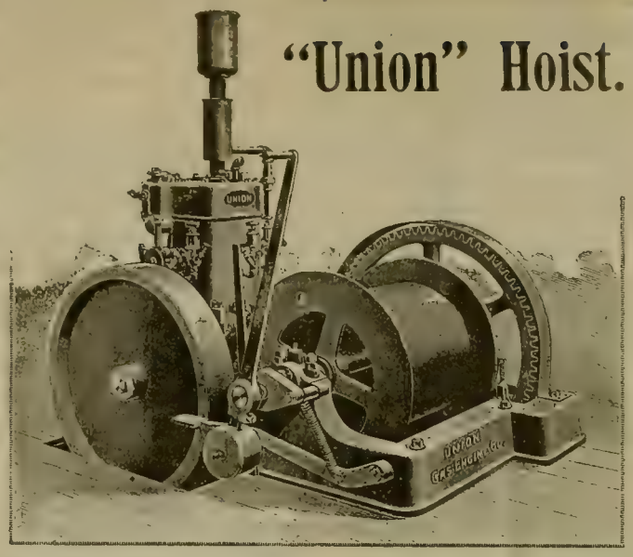


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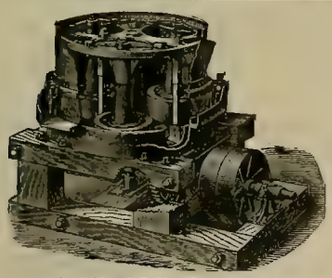
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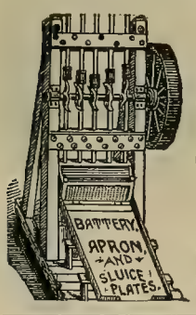
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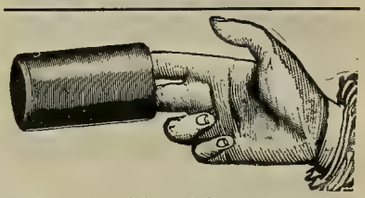
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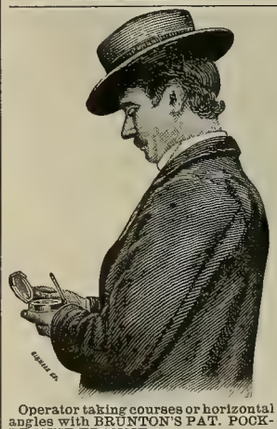
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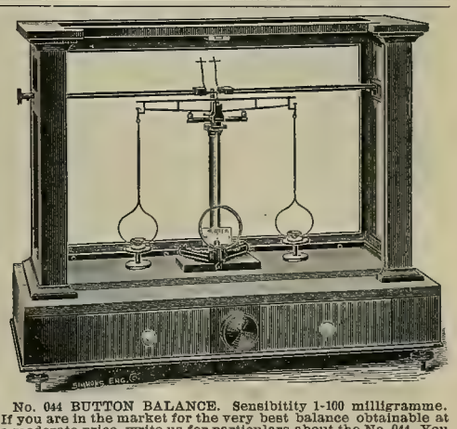
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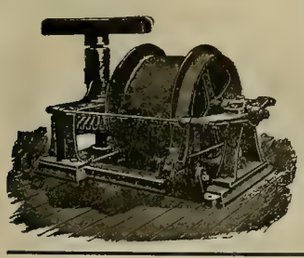


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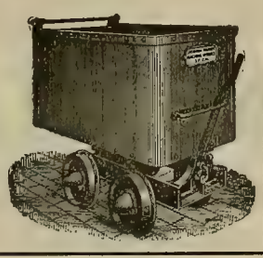
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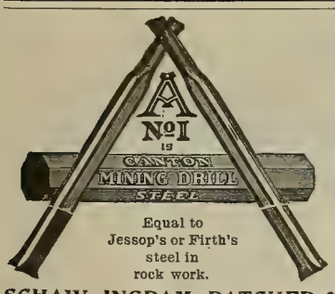
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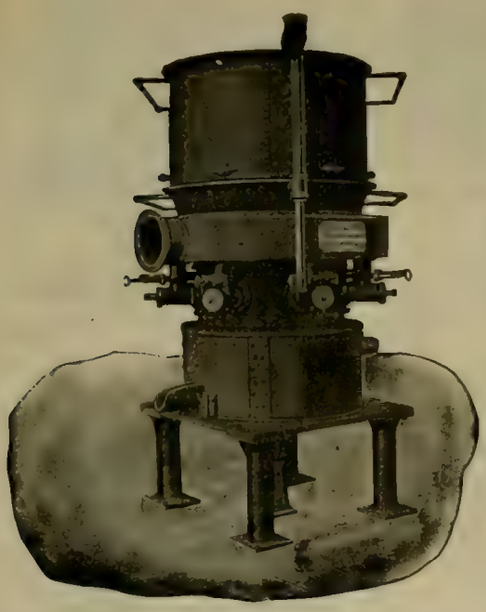
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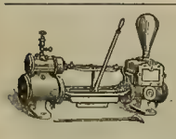
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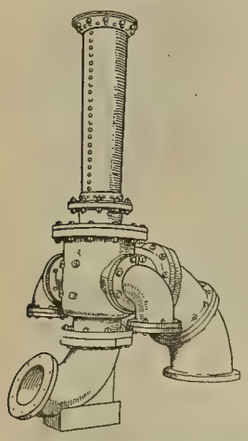
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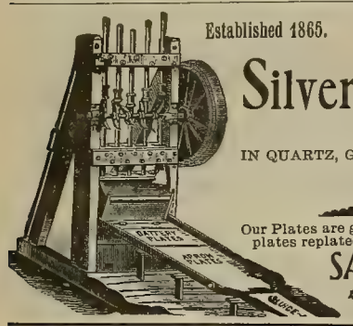
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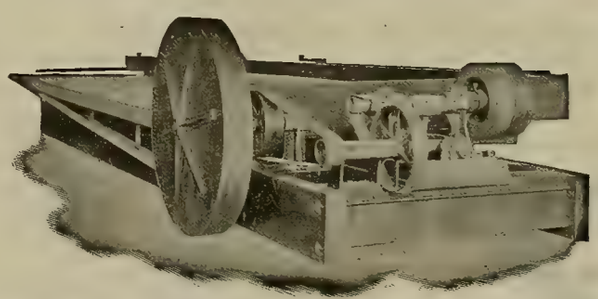
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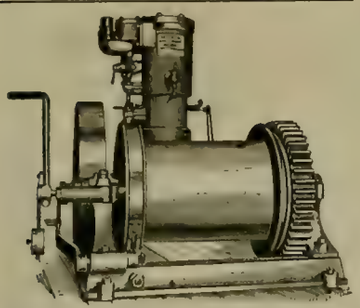


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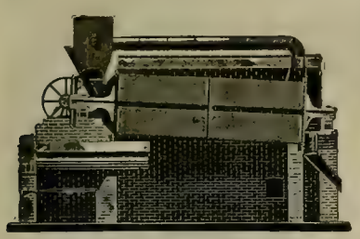
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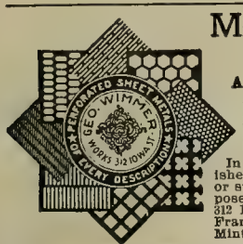
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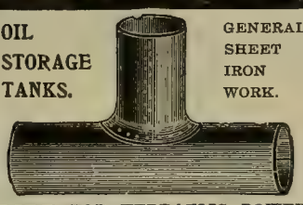
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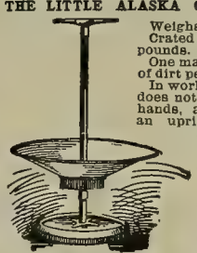


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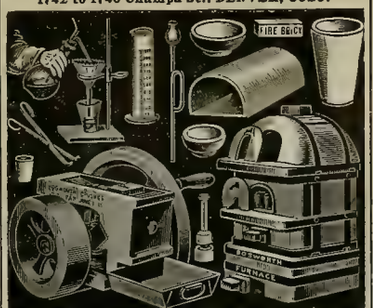
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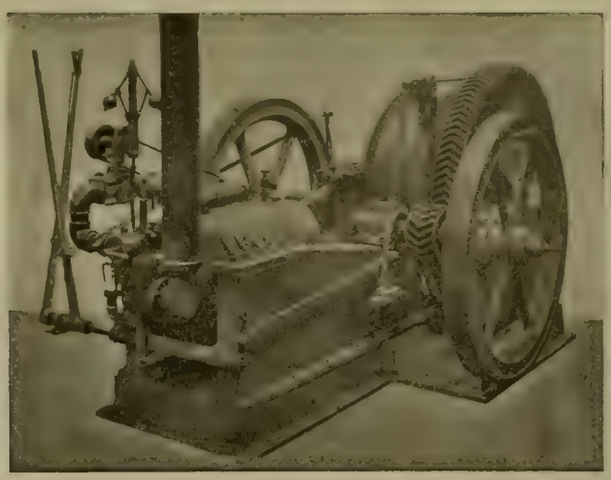
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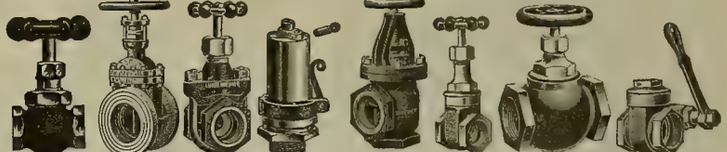
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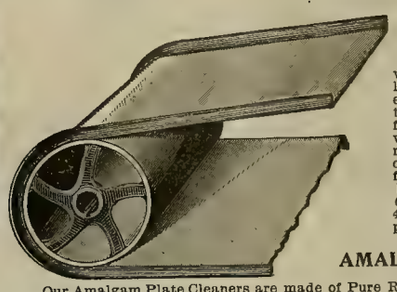


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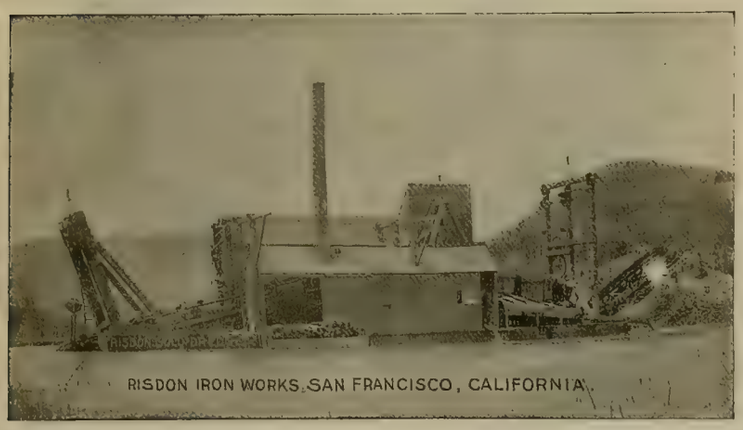
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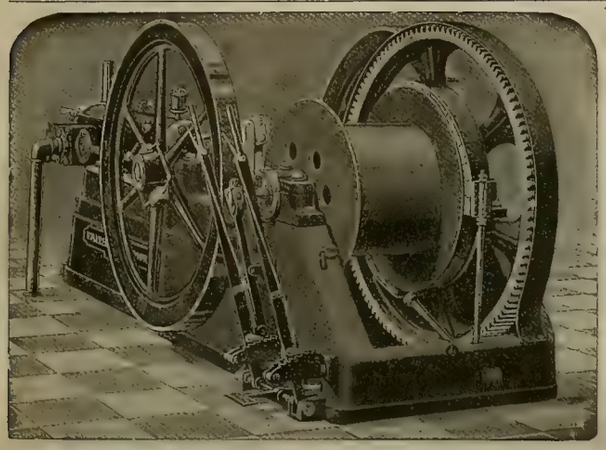
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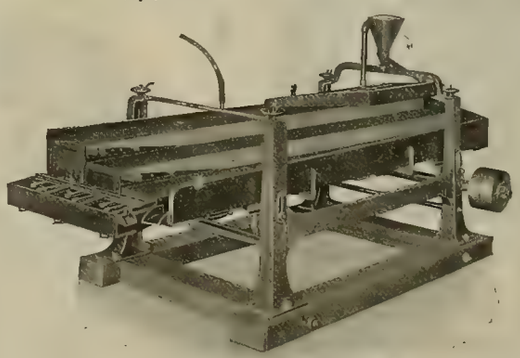
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Fig. 1.—The Lightner Mine, Angels, Cal.



Fig. 2.—A California Flume; Capacity, 6000 Inches.



Fig. 3.—Hydraulic Mine, Butte County, Cal.

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The Lightner mine adjoins the Utica-Stickle mine at Angels, in Calaveras county, Cal., and is one of the latest properties on the central gold belt to attract attention. The headframe shown in the engraving (Fig. 1) is of the type commonly seen at California mines.

An idea of the size of an ordinary California flume may be gained from the accompanying picture (Fig. 2), which shows a horse and wagon being driven along it with abundance of room on either side.

The illustration of the pipe line crossing the mine on a suspension bridge (Fig. 3) is a scene in Trinity county, Cal. Three thousand miner's inches of water are conveyed by this pipe line, the water being used in hydraulic mining.

A typical hydraulic mine is illustrated in Fig. 4, although the monitors which give a characteristic appearance to such a scene are not in operation. The clearing of bedrock is the last act in hydraulic mining, and this process is in progress in Fig. 5.

Prospectors are prone to run their tunnels under a low hill and as close to the surface as they dare. The accompanying engraving (Fig. 6) illustrates a typical example.



Fig. 4.—Cleaning Bedrock in a Hydraulic Mine, California.



Fig. 5.—Pipe Line Crossing River on Suspension Bridge.



Fig. 6.—Entrance to a Fresno County, Cal., Mine.

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Future of the Rand.

The cyanide process is the cause of the present war in South Africa. The process made possible the profitable working of the banket reefs; the profit went too largely to the Boers to suit the Uitlanders, hence the war of conquest. These are the facts in short meter. They show the influence of modern metallurgy on modern history.

With politics—State, national, or international—this journal has nothing to do; the present conditions in the South African gold fields constitute a topic of interest to every metal miner and metallurgist, by reason of the magnitude of the gold mining and milling industry there, and its present cessation.

John Hays Hammond, a California miner, who has had foremost charge in Johannesburg, has been interviewed, and his interview has been made the basis of an article on the South African situation in the January number of the Engineering Magazine.

The Witwatersrand produced in '98 about 25% of the total gold product of the world, and Mr. Hammond thinks that had there been no interruption the gold output in '99 would have exceeded $100,000,000, coming almost entirely from a territory in a radius of twenty-five miles from Johannesburg. So vast a gold production exercises an enormous influence in the business, industrial, mining and engineering world, and the present war, occasioning interruption of that gold yield, evokes attention commensurate with the interests involved.

Mr. Hammond thinks that while destruction or impairment of mine equipage might not receive official sanction, there may be considerable wrecking of property, and that during the continuance of the war the Boer government will work the mines with a view to extraction of the maximum amount of gold with the minimum amount of care and development work; that the mines will be gouged and the machinery driven to death. He is also of the opinion that good will ultimately come of the conflict; the mines themselves—that is, the gold deposits—can not be destroyed, and with peace will come opportunities for reform and economy in mine operation that could not heretofore have been put in practise—increased tonnage of ore at decreased cost of treatment, thus compensating for present loss. Among the expected improvements upon the return of peace are cited the cheapening of cost of dynamite, and mining supplies in general, suppression of traffic in stolen amalgam and gold, improvement in means of securing native labor, regulation of liquor traffic, and, in general, the dominance of advanced methods. Mr. Hammond deems it within the limits of practical probability to work the Witwatersrand mines to a depth of 8000 feet. This, of course, involves considerable development work, and an assurance of continued security that could not be afforded during Boer dominance.

The future of South Africa's gold fields affects indirectly gold mining everywhere. It looks as though England may smash things ultimately and achieve final conquest, not solely for commercial aggrandizement, but as a "military necessity." England must conquer the Boers or be assailed in every part of her empire. In such event it can, therefore, be assumed with considerable degree of certainty that next year or the year after the gold deposits of the Witwatersrand will be exploited to their fullest extent, and that there will be a renewal in at least equal volume of the golden stream that has been pouring into the arteries of commerce from there since 1887.

As against the opinion of ultimate English success many unprejudiced men maintain that England has no likelihood of winning. In the Boston News Bureau of the 5th inst. a financier's opinion on the subject is thus given: "The fall of Ladysmith should be a favorable financial fact, because it should mean the near consummation of the war and the reopening of the South African gold mines for the benefit of the world's industry and commerce. There is only one result to this war, and that is the defeat of the English sooner or later. There is only one way for the Boers to fight and they have pursued that way perfectly, and that is on the defensive, behind entrenchments. They have not attacked the British in the open, and so long as they refrain from doing this they cannot be crushed without a sufficient number of men to surround them or flank them. England cannot spare from her own country enough men to surround the Boer armies. The Indian monetary commission unanimously reported that to place India on a gold basis, it would be necessary to sacrifice the English agricultural interests. The English yeomanry are not now available for foreign war. They have migrated to Australia and Canada and from Canada into the United States. The English yeomanry in the colonies are rallying to the support of the home government very admirably, and in time England may command enough men, if her colonies are loyal, to defeat the Boer armies in the field, but the certain result of this is the practical destruction, at least for some years, of South African gold mines. The machinery will have been destroyed one way or another, and the mines made practically unavailable for any immediate production. English success in South Africa means the obliteration of the Boers, the reconstruction of the gold mining industry and the repopulation of the country. The task is too great for the British Empire, and in the interest of civilization and the protection of the world's gold supply, a halt should be called, and the sooner the better. I believe our English cousins would be very glad if the United States would head a movement for the stoppage of this war, a settlement of the whole Boer question by arbitration, and the reopening of the South African gold mines under some kind of an international guarantee. England is whipped, and she can do no good to herself or anybody else by prolonging a useless war."

THIS year is as prolific in mining frauds as any of its predecessors. Gold mines are not as much a subject for the swindlers as formerly. Oil and copper are the favorite forms of spurious offerings at present. Eastern papers and magazines contain seductive advertisements of oil and copper mines in California and elsewhere, stock in which is offered with alluring statements concerning alleged profit. This stock is doubtless bought extensively by people who know no more about mining than mining does about them, and with money that many purchasers can ill afford to lose. There is little use in exposing those schemes; the kind of people who buy on the basis of such misrepresentation never see a mining paper and the journals that publish the lying prospectuses take good care to make no reference to any expose of the swindle. As for the mining public, they are, of course, too well posted to put the slightest faith in the ridiculous statements published. The one surprise is that apparently reliable and respectable journals will prostitute their columns and help swindle their readers by accepting such advertisements. The worst of these copper swindles, so far as California is concerned, at present emanate from Philadelphia.

The Status of Alien Locators of Mineral Lands.

The receipt of letters calling attention to the location of mining claims within United States territory by aliens, and particularly in Alaska, brings the existing and unsatisfactory condition of the mining laws relating to this matter into unusual prominence, in view of conditions now obtaining in Alaska.

The United States statutes plainly state that the mining lands belonging to the United States, both surveyed and unsurveyed, are subject to location by citizens of the United States or those who have declared their intention to become citizens. It is clearly evident that the intention of the law is that only citizens, or those who have declared their intentions to become such, shall locate and appropriate mineral lands; but aliens not infrequently do locate mineral claims, and to dispossess them is not, under existing laws, a simple matter. Instances where aliens locate or purchase from citizen locators and transfer the mineral lands of the United States are of frequent occurrence.

There has been much litigation arising from the transfer of mining claims by citizen locators to aliens, and of the latter to others, but the courts do not appear to have determined the status of an alien at all satisfactorily, and there has been a diversity of opinion. Concerning this, Lindley on Mines says:

Out of the chorous of discordant sounds it is difficult to evolve harmony. We think, however, that, considering the underlying principles which should govern the construction and administration of the law, the weight of authority, as well as motives of public policy, we are justified in deducing the following conclusions on the subject of alienage as affecting titles to unpatented mining claims on the public domain: (1) An alien may locate or purchase a mining claim, and, until 'inquest of office,' may hold and dispose of the same in like manner as a citizen. (2) Proceedings to obtain patents are in the nature of 'inquest of office,' and in such proceedings citizenship is a necessary and material fact to be alleged and proved. (3) In all other classes of action between individuals with which the Government has no concern, citizenship is not a fact in issue; it need be neither alleged nor proved. (4) Naturalization of an alien at any time subsequent to either location or purchase is retroactive and enables him to proceed to patent by reason of his alienage being removed. These conclusions are not altogether palatable, but we consider that they are forced upon us by the logic of the law. There is only one limitation upon these conclusions which may be plausibly asserted, and that is this: A qualified locator may relocate a claim in the possession of an alien who has not declared his intention to become a citizen, if such relocation may be made without force or violence and prior to the naturalization of the alien, as the alien might be deemed a mere occupant without color of title. The relocator is then in a position to contest the alien's right to patent. He would have the status of an adverse claimant, without which he would have no standing in court. * * * * We are loth to believe that a location by an alien is, under all circumstances, such a segregation of the tract from the body of the public domain as will inhibit a relocation by a qualified locator who enters peaceably and in good faith for that purpose.

From the above it will be seen that the matter is in very unsatisfactory condition. The alien may not attempt to patent his claim, as that is not required by law, but he may work it and derive large pecuniary benefit from it, while depriving a citizen of that privilege, for under most circumstances it is difficult to conceive a "peaceful" relocation of a rich mine being worked by another.

The Government only can intervene and dispossess the alien by "inquest of office," which means that an official investigation as to the citizenship of the locator may be instituted by the Government, and this in most cases would not be done promptly.

Under the laws governing agricultural filings, a citizen may file an adverse claim and thus at once institute a contest which invariably results in the dispossession of the alien. The matter should either receive immediate congressional action or officers should be appointed by the Government for the several mining districts, particularly those of Alaska, to protect the mineral lands of that section from wholesale location by aliens, as is now being done.

The entire matter is another instance of the pressing need for a Federal Department of Mines and Mining, when all subjects relating to the vast and rapidly growing industry which is the real basis of the nation's prosperity may receive the same prompt attention and intelligent consideration that is given other resources of the nation.

Concentrates.

THE contents of this paper are copyrighted.

THERE is a "permanent and available market for platinum" in New York and San Francisco.

BEYOND a yellow discoloration sulphur oxide or sulphurous acid would have no effect on asbestos.

THE mineral from Borax lake, Cal., is northupite—a double chloride and carbonate of sodium and manganese.

MODERN METALLURGY began in 1850, but has made greatest advances during the past ten years.

SULPHIDE OF GOLD has as yet never been isolated from any of the ores, and its existence in nature is a matter of doubt.

WITH few exceptions California mining dividends are carefully concealed. In Utah and Colorado they are widely published.

"P & B" PAINT is probably the best to use around a mine, either for wood or metal. It is fire and acid-proof and is an excellent preservative.

A MAGNET is demagnetized by a red heat. Temperatures produced by steam under 100 pounds pressure would not so affect a permanent magnet.

WITH a forfeited mining claim go the improvements thereon to the relocator. This includes buildings, machinery, etc., on the claim at the time of legal forfeiture.

HYDROGEN PEROXIDE added to the cyanide solution effects more rapid oxidation of the cyanide, and hence shortens the time occupied in dissolving the gold from the ore.

"JOSHUA WOOD" is the trunk and limbs of the yucca palm in the White Hills, Arizona, district. A cord of it will serve as fuel for a 25 H. P. hoisting and pumping engine for ten hours.

WHERE a note is given by one party and accepted by another with whom he has had dealings, the presumption obtains that it was intended as a settlement and satisfaction of all antecedent demands.

RUSTY steel can be cleaned with a mixture of—tin putty, 10 parts; prepared buckshorn, 8 parts; spirits of wine, 25 parts; mix to a paste; rub on the part to be cleaned, and wipe with blotting paper.

A GOOD magnesium flashlight can be made by sandwiching magnesium powder between sheets of paper impregnated with potassium chlorate. This, when properly prepared, is safe and satisfactory.

A PROMISE by a debtor to pay his creditor out of a designated fund, of which the debtor retains control, when the same is received by him, is a personal agreement only, and not a lien upon such fund.

MAGNESIAN LIMESTONE can be converted into hydraulic lime by burning it just hard enough to expel the dioxide of the magnesium carbonate, but not so hard as to expel that of the calcium carbonate, i. e., about 400° C.

IT was an ancient superstition among miners that tin would grow if the mines were to remain idle thirty or forty years. This idea has been traced through the centuries from the Phœnician miners in Spain to our own day.

THOUGH divisible by four this will not be a leap year. No leap year occurs between 1896 and 1904. Every fourth century has twenty-five leap years. The next century, the twentieth, will thus be one day longer than this one is.

THE Red Jacket shaft at the Calumet & Hecla mine cuts the lode at 3200 feet but is over 2000 feet deeper. Its size is 13½x23 feet inside timbers. The weight of the cage is 3000 pounds; the maximum speed of hoisting is 2000 feet per minute.

MICA in small flakes is a common constituent of granite, but is of commercial value only when in sheets over 4 or 5 inches square. The sample sent is of no value. A. O. Schoonmaker, 158 William St., N. Y. City, deals in marketable mica.

NOTHING about a mine, large or small, should be given more care than the making of good, substantial ladders, and placing them securely in the shaft or where needed. Frail structures of this class, poorly placed, are a menace to the lives of all who use them.

THE Mt. Morgan, Australia, mine has yielded gold 997 fine. The purest gold so far found in nature was taken from the Pike's Peak mine, Cripple Creek, Colorado, in '94—999 fine. Gold has been found in Calaveras and Tuolumne counties, Cal., 994 fine.

THE best work on gold milling in California is Bulletin No. 6, issued some years ago by the California State Mining Bureau. Its author is E. B. Preston. It is out of print. In case the Bureau can spare a few dollars it is possible another edition might appear.

PRECISE data as to the temperature of the sun is difficult to procure, no two observers agreeing. Recent minute calculations indicate a solar temperature of 5130° C., or 9266° F. Thirty-eight of the seventy-four chemical elements are found in the sun.

THE Zymean process does not receive much consideration from practical men. It consists of treating gold ore with sulphur chloride and a saturated solution of common salt. Sulphurous acid is given off from the dissolving tank and is used to precipitate the gold from the filtrate. If sulphur is not present in the ore, then sulphur must be added. The inventor adds nitrate of soda when gold is present in the ore. The theory is a pretty one, but the practise has not proved profitable.

WHERE the number and date of any U. S. patent are given, this office will undertake to supply printed copies thereof at ten cents each. The illustrated notices of recent mining and metallurgical patents that weekly appear herein are specially prepared for this paper.

IT would be difficult to determine where "the best mining is now carried on." Perhaps, all things considered, the work in the Lake Superior copper mines would compare favorably with any other metal mining for scientific advance, economy and improved appliance.

THE essential difference in quality between magnet and annunciator wire is in the insulation, the latter having paraffine in the insulation, the former having a thin insulation of cotton alone. To run too high an amperage through a wire will melt it; 25 amperes is a safe carrying capacity for No. 18 wire.

A GOOD fire extinguisher is made as follows: Eight parts common salt, six parts sodium bicarbonate, two parts Glauber's salt, two parts calcium chloride, two parts sodium silicate. Another mixture to put out a fire is made of: sal-ammoniac, 5%; sodium sulphate, 30%; sodium bicarbonate, 20%.

THE reports of the United States Geological Survey may be obtained through the agency of Congressmen. The maps may be had by purchase, few of them costing over 25 cents each. Communications should be addressed to Chas. D. Walcott, Director United States Geological Survey, Washington, D. C.

A GOOD resolve for 1900 is at the earliest opportunity to secure a United States patent for a mining claim. It is always well, it saves further assessment work, avoids litigation, and in case of desiring to sell is of prime importance. A good claim is easier of sale when the vendor can show title of U. S. patent.

PLATINUM mining, as such, is not known in California, though from California comes most of the platinum found in the United States. It is associated with placer gold, but is a "by-product" in this country. Platinum and vanadium have both been found in the ashes of certain coals in New South Wales.

A POSITIVE INDICATOR on a hoisting engine is a device geared positively to the drum shaft, and moving a target or indicator just as certain as the revolution of the drum raises or lowers the cage. Indicators arranged to work by use of a string or wire should not be depended on where men are raised or lowered in the shaft.

PURE gold will volatilize at a high temperature. It melts at 1045° C. (copper melts at 1050°, silver 945°), and, if kept at the melting point or slightly above, will not volatilize appreciably. When, however, that temperature is greatly increased, gold volatilizes, and, in the case of impure gold, that metal is volatile at considerably lower temperature than that stated.

MAGNETIC saturation is the maximum magnetic force which can be permanently imparted to a steel bar. A bar may be magnetized beyond this point, but soon sinks to it. The magnetism produced in a bar is prevented from depolarization by the retentivity or the coercive force of the bar. The higher the degree of magnetism the greater the tendency to depolarization.

METEOR STEEL resembles in its superficial substance the wavy appearance of Damascus steel. Twenty-four parts of zinc, four of purified nickel, and one of silver are put into a refractory crucible, the surface covered with charcoal powder, the cover luted on, and the whole subjected to heat till fused. When melted the mixture is poured into cold water to make it brittle.

AUROCYANIDE OF POTASSIUM is prepared by dissolving metallic gold, auric oxide or aurous cyanide in a solution of potassium cyanide, the salt crystallizing out upon evaporation of the solution. So long as the solution contains free potassium cyanide it is quite stable, but the aqueous solution of the crystalline salt is readily decomposed by the addition of salts of zinc, iron, tin or silver.

COLORADO has produced about $230,000,000 in gold; of this nine-tenths has been produced by modern methods. California has produced about $1,350,000,000; of that amount probably 75% has been produced by amalgamation. As late as 1868 this paper offered a reward of $5000 for a successful method of treating the gold sulphurets. "The best all-round process of metallurgy" is smelting.

A HORIZONTAL tubular boiler of ordinary proportions, 60 inches in diameter, 16 feet long, containing 83 inch tubes, has a surface area of 40,716 square inches. If operated with a working pressure of 100 pounds per square inch, the boiler sustains a total pressure of 4,071,600 pounds. The energy set free by the explosion of such a boiler at such a pressure is equal to the explosion of 1290 pounds gunpowder.

A COPYING INK that will copy legibly on tissue paper without water or a copying press can be made by taking 10 oz. nigrosine, C. P. fine, glucose A, 1½ oz., hot water 1¾ pints, and glycerine 1¼ oz. The nigrosine is to be dissolved by trituration in the hot water, the other ingredients to be then added and the mixture strained through a piece of silk. If too thick to flow from the pen readily it can be diluted with water.

THE Rossland, B. C., Miners' Union has 1500 members; of these 850 were born on British soil. The union pays $10 a week sick benefits. The prevailing rate of wages in that section is: Machine men, $3.50; hammer men, $3. The large mines use machinery. Muckers get $2.50 a day; a certain class of machine men, called shaftsmen, receive $4, and in some instances $4.25. It is customary to pay more in wet shafts or where the ventilation is bad.

ELECTRICITY direct from coal is not deemed an impossibility. It has not yet been produced in a commercial way, but has the attention of practical scientists. If carbon could be dissolved in a fluid, as metals are, the problem could be more readily solved. Harder things to do have been done, and the right way will be discovered sooner or later. Direct production of electricity from fuel, and light without heat, will probably be among the first discoveries of the twentieth century.

MINING SCHOOLS are doing a good work and are not to be decried. In one sense every mine is a "school" for those therein, but in the mining school the opportunities for study are exceptionally good, coupled with subsequent practical work requisite for those who realize how precious time is, and how much quicker and better one can learn things necessary to know amid such favorable surroundings. Such thorough grounding in technical education makes the earnest miner valuable to himself and his employer.

THERE is nothing new that is good or good that is new in the use of magnets in recovering gold from black sand. It is an old device and extensively used. In the bed of the Galisteo river, in the vicinity of Santa Fe, N. M., a placer mining company has had some success in saving gold from the black sand by magnets, placed on the circumference of a cylinder, iron adhering thereto, the gold, non-magnetic material and water passing on to a revolving screen and run over amalgam plates into a series of boxes containing quicksilver.

TELLURIUM is a constituent of the ores of gold, silver, mercury, bismuth and lead, forming with the metallic tellurides. Tellurium is soluble in sulphuric acid, giving a red solution, from which a blackish-gray powder of tellurium is precipitated by diluting in water. Sylvanite is a gold-silver telluride-tellurium 55.8%, gold 28.5%, silver 15.7%. Hessite is a silver telluride. Petzite is hessite with silver partly replaced by gold. Nagyagite is a foliated tellurium in leaves like graphite, and contains tellurium, lead, gold, silver, copper and sulphur.

MASSIVE eruptive rocks such as diabase and diorite, granite, syenite, andesites, etc., differ so greatly in physical appearance that samples of such rocks from any particular locality would not be useful in determining rocks elsewhere from their physical appearance alone. A material difference in the texture of a rock will make a great difference in its appearance, though the composition of each may be essentially the same. In the greenstone schists it is not always an easy matter to determine whether the original rock was diorite, diabase or a fragmental rock, as the original constituents are all more or less altered and little of the original structure remains.

HEAT-RESISTING powers of different materials suitable for steam boilers and pipe coverings may be rated as follows, a combination of asbestos, hair felt, air space and wood being given 100%: asbestos, hair felt and chopped straw, the latter mixed with lime putty, 87%; plastic cement, with ½-inch half felt outside, 86%; paper pulp mixed with lime putty, 1 inch, covered with sheeting of wood pulp, 85%; mineral wool cased with wood, 81%; mineral wool cased with sheet iron, 79%; charcoal, 60%; sawdust, 41%; loam and chopped straw sealed with wood, 32%; asbestos, 29%; coal ashes, 24%; air space, 20%; firebricks, 15%; red bricks, 12%; sand, 9%.

THE full official text in the recent decision in the case of the rights of tunnel cross-vein locators was published in the issue of Dec. 9, '99. The decision by the Supreme Court of Colorado had the practical effect of giving prior locators the right of all veins crossing their side lines, and to all blind lodes existing within the territory embraced within the side and end lines of the claim, and made side lines as well as end lines the limits of operation in following a vein on its vertical dip. The crossing of two veins practically parallel on their dip was also considered by the Court and the same principle held to apply. The Calhoun Company has appealed to the Supreme Court of the United States on a writ of error.

THE leading mining machinery firms advertise in these columns, and our readers can be supplied by them with what they need at fair prices. It is their trade announcements that enable us to furnish this journal at such a small subscription price. The contents of this one issue—costing the subscriber less than 6 cents—if bound in a technical volume would cost him from $3 to $10. It is the advertising patronage that pays the most of this expense; were it not for such patronage this journal as edited could not live unless it charged $25 per year instead of $3. Of course, the advertiser doesn't have his announcement in these columns just to insure the regular appearance of a publication even of such merit; he advertises for profit, for in no other way can he get so wide an audience at such small cost. When any of our readers have occasion to buy machinery or appliances of any kind, there are two good reasons why they should buy from firms advertising herein: First, because it is those firms that make it possible for them to get this journal for $3 per annum; and, second, because none but reputable concerns are announced herein, and, being the leaders in their respective lines, can guarantee satisfaction in price and quality to their customers.

Notes on Ore Dressing.

Written for the MINING AND SCIENTIFIC PRESS by A. W. WARWICK.

Possibly there is no department of mining work of more interest than that of ore dressing. The literature on this subject is rich and varied, but so badly scattered through the journals of various scientific societies that it is necessary to have access to a large library in order to reach it.

The importance of the subject was recognized at a very early date. Pliny has preserved for us a sufficiently explicit account of the Roman system of mining to show that considerable attention was given to the washing of ores. The famous work of Agricola, "De re Metallica," published at Bale in 1561, gives a splendid idea of the miner's work at the time of the Reformation. In a series of quaint woodcuts there is shown the framing of a stamp mill, the methods of spalling and sorting ores, jigging, buddling, sluicing, etc., as practised in Bohemia and the Tyrolese mountains. Any one who has seen Agricola's book and the small mining operations going on at the present day in some of the European districts, will readily recognize how slowly progress is made, and that the old system had valuable features enough to warrant its survival. Indeed, some of the illustrations might well pass in a description of some of the out-of-date Cornish mills to-day. According to Matthesius, in his work entitled "Sarepta," written in 1589, it appears that a Tyrolean, Paul Grommenstetter, invented the jigger in 1519, and that the first stamp mill was erected at Dippoldswalde, in Saxony, about the year 1512.

About this time the Fugger family, the bonanza kings of their day, by their extensive operations in mines, gave a great impetus to the art of ore dressing.

The great religious wars, however, broke up most of the mining operations on the continent of Europe, and very little advance was made for centuries. But such inventions as were made were spread by the immigration of the old German miners, until they reached England and even the then newly found mines in Mexico and South America.

Pryce, in his book, "De Cornubiensis," published at the end of the last century, gave an account of ore dressing as practised in Cornwall at that time. This account showed that very little advance had been made since the time of Agricola, except in some small particulars.

However, Karsten (1831) gives a very good and clear account of ore dressing, and shows that, since the invention of the steam engine, a great advance had been made. Gaetzschmann ("Die Aufbereitung," 1864,) and Rittinger ("Lehrbuch der Aufbereitungskude") gave for the first time a scientific basis to the subject. Von Dem Borne, Pernolet and Von Sparre about this time published the results of their brilliant researches, and, in fact, it is chiefly to the labor of these men that we owe our exact knowledge of the principles underlying ore dressing operations.

The recent work of Monroe (1890) has done much to add to our knowledge.

During the last twenty years a great deal has been done to systematic dressing operations, especially by the introduction of automatic machinery and by improving the methods of construction. A curious feature has been the steady reversion to an old type of slime-handling machines. Until quite recently, belt vanners were everywhere replacing the shaking or bumping tables; it seems, however, that the newer forms of tables are coming into favor. One good feature of the tables is that several classes can be made, instead of two, as in the belt machines.* For simple concentration—that is, when it is simply desired to make a rich product and a class of waste stuff, the belt machine still holds its own.

The greatest difference between a modern mill and one erected, say, twenty years ago, is in the character of labor required. Then, a large corps of skilled men were required, whereas to-day one highly skilled man, with a crew of ordinary unskilled labor, can handle a plant of moderate capacity.

The laws which govern the various operations have not been added to, to any extent, since the time of Pernolet and Von Dem Borne; but a thorough sifting and assimilation has removed many erroneous ideas and enabled us to properly apply them.

In order to effect the separation of the component minerals of an ore, advantage is usually taken of the difference in their specific gravities. If two grains, of about the same size, one of quartz (sp. gr. 2.6) and one of galena (sp. gr. 7.5) are subjected to the action of water or air in motion, it will be found that, under certain conditions, the grain of quartz will be transported, while the particle of galena will remain in statu quo, or, in any event, will not be transported as rapidly as the quartz grain. This is the principle underlying most dressing or concentrating operations. It fortunately happens that in most cases the valuable minerals have a higher specific gravity than the vein fillings or the worthless minerals. It should be added, in parenthesis, that coal, ozokerite, etc., are exceptions, each being lighter than the minerals from which they have to be cleansed.

It happens in some cases, however, that the specific gravities of the minerals are too close to allow of separation, for example, wolfram (sp. gr. 7.1) and cassiterite (sp. gr. 7.0), zinc blende (sp. gr. 4.0) and sidrite (sp. gr. 3.8). In these cases it is necessary to take advantage of other properties than the variation of specific gravities.

It may also happen that the mineral itself may be impure; thus it is impossible to separate the lead and antimony in the mineral jamesonite by the specific gravity method, inasmuch as the mineral is a chemical compound of lead and antimony. In such cases the properties taken advantage of are (a) difference in friability, (b) magnetic qualities, (c) as a last resource, the differing chemical reactions.

Wherever possible, however, advantage is taken of the difference in specific gravity, since the chemical treatment is expensive and the other methods are uncertain and difficult. Of course, exception is made in the case of magnetic concentration of iron ores, which is certain, rapid and inexpensive.

The course of treatment in an ore-dressing plant, treating such a material as a galena ore, would be in a wet plant:

1. Crushing to a suitable size.
2. Sizing by screens and hydraulic classifiers.
3. Treatment of coarse grains on jiggers.
4. Handling of sands on vanners, buddles, etc.
5. Treatment of slimes.

Such a method of dressing or concentration is known as the German system, and is frequently adopted.

The ore may, however, be treated and good results obtained without preliminary sizing and in such cases the treatment would be about as follows:

1. Crushing.
2. Rough sorting on jiggers into (a) poor mineral and (b) wastes.
3. Retreatment of poor mineral on finishing jiggers.
4. Treatment of slimes on suitable machines.

This is the old English method; it is largely used in the lead districts of the Middle States, but hardly anywhere in the West.

These methods are all wet, involving the use of enormous quantities of water. Many attempts have been made, with varying success, to dress ores without the use of water. In spite, however, of some most ingenious machines, the dry method has made practically no headway.

The specific gravity of the commonly occurring minerals are shown in the following tables:

TABLE I.

SPECIFIC GRAVITY OF PRINCIPAL ORES, ETC.

Mineral.	Sp. Gr.
GOLD—Native	17.0—19.4
Sylvanite	5.7— 8.2
Nagyagite	6.8— 7.2
SILVER—Native	10.1—11.1
Cloride	5.5
Argentite	7.1— 7.3
Stephanite	6.2
Ruby	5.5
MERCURY—Cinnabar	9.0
NICKEL—Smaltite	6.5— 7.0
Kupfenickel	7.3— 7.6
Chloanthite	6.5
Garnierite	2.3— 2.8
LEAD—Galena	7.2— 7.6
Cerussite	6.4— 6.5
Anglesite	6.2— 6.4
Wulfenite	6.3— 7.0
Pyromorphite	6.6— 7 0
COPPER—Native	8.8
Glance	5.7
Pyrites	4.1— 4.3
Malachite	3.7— 4.0
COAL—Anthracite	1.1— 1.8
Bituminous	1.2— 1.4
GRAPHITE	2.0
ZINC—Blende	3.9— 4.2
Calamine	4.0— 4.5
Smithsonite	3.2— 3.5
ANTIMONY—Stibnite	4 5— 4.6
Jamesonite	5.7
BISMUTH—Native	9.7
ARSENIC—Mispickel	6.3
Realgar	3.5
IRON—Magnetite	5.0
Spathic iron	3.8
Pyrites	4.8— 5.1
Hematite	4.5— 5.3

TABLE II.

SPECIFIC GRAVITY OF MINERALS ASSOCIATED WITH ORES.

Mineral—	Sp. Gr.
Barytes	4.6
Witherite	4.4
Wolfram	7.2
Flourspar	3.3
Calcite	2 5
Quartz	2.6
Selenite	2.3
Celestite	3.9
Chlorite	2.7
Feldspars	2.0—3.0
Hornblende	3.0—3.4
Shale	2.5—2.7

However, in using these tables, it must be noted that minerals of high specific gravity are not necessarily easily saved. For example, chloride of silver is notoriously difficult to save; where it occurs as horn silver no great difficulty is experienced; but, as it usually occurs as an extremely soft, friable powder, there is great difficulty in saving it.

The question of friability plays a very considerable part in ore dressing operations. As is well known, the fine material as it comes from the mine is nearly always richer than the larger lumps. By systematic screening the large waste dumps at the Cripple Creek mines and shipping the fines a great deal of the values were obtained; even after these operations, by washing the larger lumps, to free them from adhering dust, settling the slimes and drying the resulting mud, a further yield was obtained. It will be seen, therefore, that the friability of a mineral is of considerable importance, especially from the point of view of the ore dresser, owing to the fact that the fine sands and slimes are not only richer than the balance of the ore, but that it is more difficult to save the values.

It can be easily seen that, in designing a concentration works or dressing mill, a great number of considerations must be taken into account. A few principles which govern the design of a perfect mill, and which may even be called rules, are:

1. Absolute automacity and perfect separation is a practical impossibility. Any attempt to make the best possible separation of a complex ore with an automatic mill generally results in the overcrowding of certain parts of the mill or the reduction of its capacity.
2. The system of crushing is the best which produces the smallest quantity of fines. There is always a size below which it is unnecessary to reduce the ore, Any stuff finer than this is a waste of energy, and
3. The more finely divided is the material to be treated the greater the loss and the greater the cost of treatment.
4. It is desirable to save and separate the minerals as early in the process as possible.
5. The site of the mill should be chosen so as to have (a) ample room for machines without crowding, (b) a good head of water at command, (c) ample dump room and (d) facilities for cheap transportation from mine to mill.

*The Luhrig vanner is, however, a belt machine that is capable of making several classes of ore. The writer has made some fair separations with this machine.

New Electrolytic Process of Manufacturing Chemicals.

There has just been started at Farnworth, near Liverpool, England, the Hargreaves–Bird new process to separate chlorine and sodium by the direct decomposition of salt by electrolysis, without the introduction of other ingredient. The salt used is in its cheapest form—that of brine pumped from its native bed, the salt of which, delivered into the actual apparatus of the factory, costs 6 cents per ton, as against $1.70, the usual price for the rough salt used in the older alkali works. The apparatus is a narrow tank, with porous walls. Brine is pumped into it, and on the passage of electricity a solution of soda flows slowly down from the outside of these wet walls, yielding at once soda crystals; the chlorine in like automatic manner passes away for the production of bleaching powder, chlorate of potash or such other chlorine compounds as may be required. No furnace, nor sulphur kilns, are longer necessary. No waste materials are produced, unless as such be reckoned the ashes from under the steam boilers which produce the motive power for the generation of the electric current. Even the smoke from the boiler fires and the waste steam from the engine are used in carbonating and dissolving the soda thus formed. In the actual production scarcely any hand labor is required. All moves on in silent regularity, and it is only in the necessary handling and packing up of the materials produced that labor comes in. One distinction of the cell is the peculiar diaphragm used. It is a sheet of asbestos composition, non-porous in the ordinary sense of the term; but when forming the walls of the cell, the contents of which are electrically excited, it allows molecules of sodium hydroxide to pass, but very little sodium chloride. It is claimed that the above process is much more economical and simple than the former, including the rival electrolytic methods. One difference between the Hargreaves–Bird process and the Kastner–Keller process is that mercury is used in the latter process, but not in the former. Large sums of money have been spent in experiments with different electrolytic methods with varying success, and it is too early yet to say whether the new process will meet expectations.

IN putting on the twenty-five bunches of laths, or 1250 laths, which constitute a day's work, 7500 nails are driven. Over half of the laths are handled twice, and some are handled three times. Every whole lath has at least four nails, and with the broken laths it will average six nails to the lath. It takes two distinct blows of the hatchet to drive each nail, making 15,000 blows, or 1875 blows of the hatchet for each of the eight hours. The men must build their own scaffolding and handle the laths from the floor to the scaffolding. They must stoop to pick up each lath

and place it against the ceiling and walls and arrange the breaks and fit and space the laths, making fifteen more distinct moves, or 18,750 in handling the 1250 laths. Add to this the 15,000 strokes of the hatchet, making 33,750 motions in a day, or 4218 motions an hour, or a little over one motion a second, not allowing for the time and extra labor in building the scaffolding. It is an utter impossibility for the lather to put on an average of more than 1250 laths in a day and do his work right. They receive $3 a day. The best men average three days work a week, or $9 a week.

Cyaniding in New Zealand.*

Written by JAMES PARK, Thames, Auckland, N. Z.

Apart from three or four small plants for the treatment of tailings in the South Island, there is no cyaniding of any moment in New Zealand, outside the Hauraki gold fields in the province of Auckland.

The Hauraki peninsula is eighty-five miles long and varies from four to twenty miles in width. The surface is broken and everywhere densely wooded. The principal physical feature is a rugged axial mountain range, running in a somewhat sinuous course from one end of the peninsula to the other. It varies from 1200 to 3200 feet in height and forms the main divide or watershed from which innumerable subsidiary ranges or spurs, generally bold and precipitous, descend to the sea on both sides.

The average yearly rainfall is about 52 inches, and although the configuration of the peninsula forbids the existence of large rivers, there is no lack of small, never-failing streams which, as sources of power, make up for their deficiency in volume by the steepness of their descent.

Except at the Thames and Coromandel, the mining camps are much scattered.

GEOLOGICAL CONDITIONS.—The principal gold-bearing formation is of volcanic origin, consisting of a great accumulation of andesite lavas, tuffs, breccias and agglomerates. These are found in all stages of decomposition or alteration; and in many mines the hard, blue andesite can be seen to pass by a series of almost insensible gradations into a soft, or fairly hard, greyish yellow or blue altered rock to which the name propylite has been applied.

It is in this altered andesite that the veins yielding pay ore occur. They vary from a few inches to 40 feet in width, but in linear extension they can seldom be traced for any considerable distance. The ore values are also irregular, and in no case is the same vein or lode worked with profitable results in two adjoining mines.

TREATMENT OF ORES BY AMALGAMATION.—In the northern gold fields the ores, with a few exceptions, are free milling, consisting for the most part of greyish-blue quartz which generally carries pyrites ranging from $\frac{5}{10}$% to 2%. The gold is alloyed with silver to the extent of nearly one-third, its average fineness at the Thames being .680 and at Coromandel .760; but in most mines the fineness is subject to great variation, and even in the same lode the value will sometimes vary several shillings per ounce within the height of a stope. The gold occurs in leafy plates and in the form of a fine pepper-like dust scattered through the stone. It seldom exists in the sulphurets, and it is a matter of universal experience that in the battery tailings the values lie principally in the coarse sands.

In a pay ore, which means anything over 5 dwts. per ton, "colors" of gold are plainly visible in the stone; and conversely, an ore in which no gold is visible to the eye is seldom or never pay ore.

These ores are treated by wet crushing, plate amalgamation and blanket concentrations. The tailings are concentrated on Cornish buddles, and, if they contain a value of 2 dwts. or more per ton, are ground and amalgamated in some pattern of continuous overflow pan. The blanketings are ground and amalgamated in pans.

At the Moanataiari 60-stamp mill I tried, for a time, plate amalgamation, followed by close concentration with vanners and buddling of coarse sands. But after a few months' run this experiment was abandoned as unprofitable, principally on account of the low grade of the ore and resulting concentrates, and the high cost of cyaniding the latter. Subsequently the vanners were run so as to collect the coarse sands as well as the sulphurets, which were afterwards ground and amalgamated in pans.

The treatment by this method of 576 tons of high-grade ore, lately finished, gave a recovery of gold amounting to 82.51% of the assay value.

The 576 tons of general ore yielded eighty-five tons, or 14.75% of coarse concentrates, having a value of £9 4s 6d per ton, giving a total value of £784 2s 6d, of which 86.11% was recovered by pan amalgamation at a cost of 5s 5d per ton for quicksilver, water, labor, etc.

The crushing, milling and amalgamating costs of the general ore and concentrates amounted to 6s 10.78d per ton of 2240 pounds, or 6s 0.12d per ton of 2000 pounds.

TREATMENT OF ORES BY THE CYANIDE PROCESS.—In the southern portion of the peninsula the pay ores consist of whitish-grey chalcedonic or crypto-crystalline quartz, often possessing a wavy, banded structure of alternating layers of grey and blue flinty quartz. They are comparatively free from base sulphurets.

The gold is about .645 fine and usually associated with silver sub-sulphide (Ag_2S) in varying proportions. It is generally extremely fine, being seldom visible to the eye, and in the great bulk of the Waihi ore it is impossible to get even a color by panning.

DRY CRUSHING.—Prior to the introduction of the cyanide process these ores were treated by dry crushing and hot pan amalgamation with chemicals, by which a recovery of 65% was effected.

When cyanide treatment was adopted, dry crushing was naturally continued at the different mills, the dry pulverized material being charged into shallow vats and treated directly with cyanide. From 65% by pan amalgamation, the recovery rose at a bound to 85% and in some cases to 90%, and the results were so satisfactory that no further improvement was considered possible.

In a few years, however, it became apparent that dry crushing possessed many disadvantages, as compared with wet crushing, the principal ones being the cost of the preliminary drying of the ore, the low duty of the stamps, and the large number of vats required for leaching. In 1897, mine owners began to turn their attention to wet crushing, and one by one, since the beginning of 1898, the different mills have been adopting wet crushing, until at the present time dry crushing is the exception and not, as it was two years ago, the rule.

The practice of dry crushing as carried on at the Waihi Co.'s mills, although not an example to be followed, may be of some interest.

DRYING THE ORE.—The ore is dried in brick-lined kilns, which consist of open circular holes excavated in the solid rock. The kilns at the old 90-stamp mill were 37 feet deep and 20 feet in diameter, their capacity being about 100 tons. At the new 100-stamp mill the kilns hold a charge of 500 tons each. The lower part of the kiln is finished off with a brick arch, having a door and an iron chute for discharging the dried ore into trucks, which have access to the kiln by means of a tunnel.

The kilns are charged with alternate layers of ore and wood, the layers of wood being about 5 feet apart. When the kiln is fully charged the wood is lighted, and after it is all burned up about half the charge is withdrawn and an equal portion of raw ore is added on top, together with the necessary firewood. When this second charge is burnt the lower half of the charge is withdrawn and another charge of ore and wood added on the top. Thus the successive charging and drawing off is carried on continuously.

This method of drying has very little to commend it and possesses many serious disadvantages, of which the most obvious are: (1) the high cost of fuel and labor, and (2) the risk of unconsumed charcoal remaining in the ore. In the case of pyritic ore the varying temperature to which the ore is subjected, especially in large kilns, also tends to have a pernicious effect.

At the other dry-crushing mills in New Zealand automatic revolving driers are used, the consumption of fuel being only about one-quarter of that in the open kilns.

CRUSHING AND PULVERIZING.—The dried ore is trucked to the stamp mills, passing first through a No. 5 Gates crusher and thence through a trommel, the coarse material falling automatically into a No. 3 Gates. From the crushers the ore is trucked to bins lined with sheet iron, as a precaution against fire.

The stamps weigh from 900 to 1000 pounds and drop from 103 to 105 times a minute. The height of drop varies from 7 to 8 inches. The ore is crushed through 30 or 40-mesh wire-wove screens, the duty of the stamps varying from 1.5 to 1.7 tons of 2240 pounds per day.

The dust nuisance, which at one time was intolerable, is now kept down by an exhaust air pipe, with which each mortar box is connected. The dust is caught in a dust chamber and from time to time collected and mixed with the general ore. It is a somewhat curious and interesting circumstance that the finer the dust the higher the value.

At my request E. G. Banks, the company's metallurgist, sampled the dust that had settled on the rafters and timbers of the mill house, with the following results:

		Value per Ton.		
		£	s.	d.
A.	Dust from floor of mill to 10 feet high.	6	16	4
B.	" " 10 feet to 20 feet high.....	7	2	4
C.	" " 20 " 30 " "	7	3	1
D.	" " 30 " 40 " "	7	19	11
E.	" " 40 " 60 " "	8	13	8

The average value of the ore from which the dust was obtained was £4 1s 4d per ton.

CONVEYING THE PULVERIZED ORE.—At the old mill the pulverized ore is conveyed to storage hoppers by means of screw conveyors. From the hoppers it is trucked to the leaching vats. At the new mill a long line of screw conveyors carries the dry pulp direct to the vats.

THE CYANIDE TREATMENT.—At the old mill there are thirty-two wooden vats 22.5 feet in diameter and 4 feet deep, with the necessary sumps, tanks, extractors, etc. At the new mill there are ten rectangular concrete leaching vats, 50x40 feet in area and 4 feet deep.

The wooden vats hold a charge of thirty tons and the concrete vats of 150 tons each. The depth of the charge in each case is about 24 inches. With a greater depth of material the difficulties attending percolation became too great for economical working.

After the charge is leveled the strong solution, containing from 0.33% to 0.4% of cyanide, is run under the filter cloth until it shows on the surface of the pulp. The balance of the solution is then run on top of the charge. The portion of solution remaining below the filter is also pumped on top.

The strong solution (in the proportion of 1 to 3 of ore) is allowed to percolate for thirty to forty hours. The weak solutions (1 to 3 of ore, and containing 0.1% to 0.03% of KCy) and the water washes are then applied in rapid succession, their filtration being assisted by an artificial vacuum of 20 to 25 inches of mercury. Each ton of ore gets washed with one ton of water in four separate portions.

About five days are required for the washings, and the total treatment of each vat occupies about six and a half days.

The residues are sluiced out through side doors, one man emptying 150 tons in eight hours.

The solutions from the leaching vats are clarified by running them through two filters, whence they pass to the zinc extractor boxes, which are of such a capacity that 1 cubic foot of zinc is provided for every ton of solution per day.

The consumption of cyanide varies from two to two and a half pounds per ton of ore treated, and that of zinc is about six and a half ounces, costing 5d per pound.

The drying and smelting of the slimes call for no special notice.

I am indebted to Mr. Banks for the following schedule of costs:

MILLING COSTS PER TON.

	s.	d.
Drying the ore, labor and fuel.....	1	0.60
Crushing, including maintenance.....	1	3.34
Stamping, including maintenance.....	1	10.69
Total.....	4	2.63

CYANIDING COSTS AT NEW MILL PER TON.

	s.	d.
Wages of labor.....	0	4.46
Cyanide.....	2	0.00
Zinc.....	0	2.00
Filter cloths.....	0	0.70
Cleanup and smelting of slimes.....	0	4.10
Total.....	2	11.26

The total cost of milling and cyaniding is 7s 1.89d per ton, not including management and general expenses, which are not given.

The actual recovery is reported by the management to be 89% to 90% of the gold, and 55% to 60% of the silver, from ore ranging from £3 10s to £4 per ton.

For a year or more bunches of high-grade pyritic ore have appeared in the lower levels of the company's Martha lode, and, with increasing depth, will probably become more abundant. It has been found that the treatment of this ore by dry crushing is not successful, on account of the partial roasting occurring in the kilns, resulting in the formation of basic sulphates, etc., which cause a large consumption of cyanide, accompanied by low extraction. Wet crushing and concentration of sulphurets, followed by cyaniding of sands and slimes, naturally suggest themselves as the proper treatment; and experiments in that direction are now being made at the old mill.

At the other dry-crushing mills on these gold fields the milling and cyaniding practise is practically the same as at Waihi, except at the Whangamata Proprietary, where the ore is pulverized by ball mills, and at Talisman, where both stamps and ball mills are used. In all cases the ore is dried in revolving driers, the use of which results in a great saving of cost of both labor and fuel. At the Talisman mill one ton of firewood dries twelve tons of ore, while the consumption of the same amount of wood is required to dry only three to four tons of ore in the Waihi open kilns.

(TO BE CONTINUED.)

A NOVEL application of acetylene has been made in lighting a mine near Ottawa, Canada. The manager of the silver and lead mine, where the application mentioned was made, recently described the installation in a paper presented to the Canadian Institute of Mining Engineers. The generating plant was placed in an out-of-the-way shaft, and $\frac{3}{8}$-inch tubing conducted the gas to the point where it was consumed in a portable burner, which could easily be fastened in any crevice in the rocks. It is claimed that the increased amount of work resulting from the use of the light more than compensated for the additional cost, not to mention the health of the men, which was said to be better, and the convenience of the portable light.

*Condensed from Transactions of American Institute of Mining Engineers.

New Prices for Lead.

Written for the MINING AND SCIENTIFIC PRESS.

The fiction of "brokers' prices" that fooled nobody has been done away with in 1900, and hereafter the basis will be the prices that ruled in New York the preceding week. That is what the American Smelting and Refining Co. will do, and for the present at least that "goes."

T. R. Jones, district manager for the combine at Salt Lake, Utah, writes: "After January 1, 1900, the American Smelting and Refining Co. wishes to do away with the brokers' quotation on lead, and in its lieu the quotation of the average actual sales in New York for the previous week will govern the settling price of lead for the week following. The full price of these average sales will be paid, less a deduction of ⅛ of a cent per pound."

The plan is to have the average price of lead which ruled in New York City during the week wired the different managers of the different districts every Monday morning, and the settlement for the current week will be on that basis—less ⅛ of a cent per lb.; for instance, to-day's quotations, $4.70, less ⅛, would make the price $4.57½.

That the market will fluctuate is manifest; that the system will not induce or insure general satisfaction is equally plain; but it is deemed an improvement over the old way. The fact that the purchasers have the making of the market, the setting of the pace and price, and can arbitrarily raise or depress values, is too obvious to need more than reference. With the lead producers of Colorado, Utah and the coast rests the final verdict.

The first effect is satisfactory, in an increased price. Lead has fluctuated so much, and "brokers' quotations" have so spoiled markets as to occasion an annual loss of many hundreds of thousands of dollars. The present quotations are the best in many years. Ten years ago lead was $3.85 (and silver was $1.05¾). In August, '90, lead went to $5, and in October of that year $5.25. In January, '91, it went down to $4.05, silver being quoted at $1.03¾. January 1st, '92, lead was $4.25; silver, 94⅝c.; and in June, '93, lead ruled at $3.40, silver 62c. Lead drooped during '94 and '95, and in August, '96, went down to $2.50 per hundred lbs. On January 1st, '97, it had advanced to $2.90; January 1st, '98, $3.70; December, '99, $4.45. The quotation of $4.57½ looks well alongside the above figures. In the new deal it is understood that the National Lead Co. has got the worst of it.

The result must be the stimulation of the mining of plumbiferous ores, for they are a prime requisite in the smelting of dry ores. It will also affect the present international relations in the importation of British Columbia lead ore. Indirectly it will also aid the producer of silver-lead ores. There is an increase in the working charges, nothing is paid for the lead in lead ores containing less than 5% of that metal. Nevada complains: "Ninety per cent of the assay of lead at New York quotations is now paid, less $30 per ton, which, with the ½ of 1 cent per pound added, makes a deduction of $32.50 per ton. In the past from $23.50 to $27.50, depending on the percentage of lead, was deducted. This will make a difference of from $4 to $9 per ton on lead. We also pay $1 per ton more for treatment charges."

The Smelting & Refining Co. say "this is the best we can do. In Utah the increased price of coke, coal and iron ore makes an additional expense to our Salt Lake smelters of $175 per day."

The new adjustment can not give universal satisfaction, but will tend to postpone the inevitable opposition that the combined smelting interests in the districts affected must inevitably meet.

The Grand Central Mine of Utah.

The Grand Central mine in Tintic district, Utah, lies between the Centennial-Eureka and Mammoth mines. The work of opening the property began in 1895, and for three years the owners were engaged in sinking and developing the mine, having to sink deep to reach the ore bodies.



Grand Central Mine, Tintic District, Utah.



John Hays Hammond.

(See page 34.)

In June, 1898, they had accumulated a surplus from which to begin paying dividends of $31,250 each, and by the end of the year they had thus divided among stockholders $218,750. In 1899 they paid $287,500, bringing the total to 1900 up to $506,250. During 1899 they paid $22,000 in the purchase of three more claims to add to the eight which the group contained, making their aggregate holdings about 220 acres. The shaft was sunk 200 feet deeper and is now down 900 feet. About 3000 feet of drifting and other cuttings were made in the mine during the year, an average of 130 men being employed. Besides this work a steam hoist capable of going to a depth of 2000 feet was put in along with a shafthouse, constructed of steel, and these with the compressor and power drills make it one of the best plants in the district. The cost of these improvements of the year aggregate $65,000, and includes a portion of the cost of the water system, of which nearly all was put in the year before. The product of the mine for the year 1899 was over 14,000 tons.

The ore is high-grade and of a desirable smelting quality. The property belongs to an incorporation with but few stockholders, and its directors are C. E. Loose, L. Hallrock and Reed Smoot, all of Provo, and George Q. Cannon and William Hatfield of Salt Lake City. L. Hallrock is manager and J. R. Twelves of Provo is secretary and treasurer.

In the mine there are large bodies of high-grade ore, while the second-class is very extensive. In mining, this second-class has accumulated to the extent of 20,000 tons.

MOUNTAIN toothache is a new addition to our bodily ills. It has attacked engineers and laborers on the Jungfrau railroad at a height of 8500 feet above sea level as a jumping toothache that attacks several teeth at a time, lasts seven or eight days and leaves the patient with aswollen face, which it takes another week to reduce. After that, the teeth are acclimated and give no further trouble.

IRON rust is a hydrated sesqui-oxide of iron. It is composed of: Iron, 56 parts; oxygen, 24 parts, and water, 20 parts. In every pound of rust there is a quarter of a pound of water. It is a case of water solidifying without freezing.

AT Cripple Creek, Colo., the combine places smelter price for gold at $19.50 per ounce, an indirect advance in treatment charges, it being an increase of $2 per ton on 4-oz. gold ore.

A California Current Wheel.

Readers familiar with the appearance and operation of current wheels in irrigation ditches or along the margins of valley streams will be interested in the use of the same device in the mountain stream known as Scott river, Siskiyou, the most northerly county of California. In streams which run low in summer and move around in their beds as they see fit the water lifter who wishes to use the wheel has to establish his construction wherever the channel may be, or else do a lot of diversion to bring the water to his wheel. In the case shown in the engraving the conductor of the enterprise evidently preferred to take his wheel to the water. He has made cribs of rock to sustain his sideworks and hung his wheels where he could get the longest run of power. The device was installed for river mining, but other arrangement can readily be constructed to convey the water, which the engraving shows has been raised several feet from its natural surface, through a flume for irrigation of adjacent lands which lie below its flow. The upper wheel is rigged not for water lifting, but for power, and this can also be conveyed by belt or cable and put to various uses. In irrigation a current wheel is sometimes used to deliver water on the bank, where it can be distributed therefrom by ditch or it may be run for power to operate a pump to deliver water at a higher level than that to which the wheel could directly lift it by its own revolution.

There are objections to current wheels, one of which is that their effective labor is limited in several ways. Another, and one which would suggest itself to any one who looks upon this picture, is that there is danger of a rise in the stream, which would tear out the wheel and land it in the next county. This is sometimes a menace to a current wheel, whether it be by the bank or in midstream, and it has to be provided for—sometimes by taking out the affair until the season for torrential flow is over. Windmill irrigators near Sacramento, Cal., unship their windmills during the wet season, so that wear and tear and danger of blowing to pieces may be prevented, and the current wheel man has to be similarly circumspect in saving his mechanical bacon.



Current Wheels in Scott River, Siskiyou County, Cal.

Premium on Gold Bars Removed.

To discourage the shipment abroad of gold coin the Treasury Department will remove the premium on gold bars at the assay office. This premium at present amounts to an export charge of one-tenth of 1%, and has helped the shipment abroad of gold coin instead of bars. This practice works directly disadvantageous to the Government. Our gold coin is now full weight and is as acceptable for export as gold bars. Exportation subjects gold to abrasion, reducing the coins in weight and thereby causing the Government considerable loss in mintage and metal. The cost of coining gold by this Government is ½%, and this may be said to constitute the loss on abraded coin. No action has been taken by the department for the removal of this premium. The officials, however, believe the premium to be so wholly disadvantageous to the Government that if any applications were made for its removal from gold bars for shipment the request would be granted. The situation at present simply lacks an application on which a decision may be made by the department to establish a precedent.

The premium of one-tenth of 1% on gold bars in-

tended for shipment abroad was established during 1895. The premium for a time was paid by exporters rather than risk light weight in abraded coin. Now that the coin is full weight the advantage of sending bars is nothing, and gold coin has formed almost the total bulk of shipments abroad. The removal of the premium was recommended in the recent report of the Director of the Mint, made to the Secretary of the Treasury.

The Director says in this report:

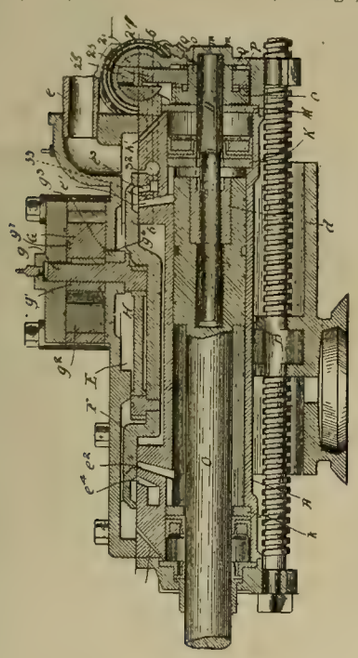
"The Superintendent of the New York Assay Office calls attention to the fact that, although about $30,000,000 in United States gold coin was exported last year, no bars were taken for export, and suggests that the export charge of one-tenth of 1% which is exacted is operating to our disadvantage. There is no object in forcing the public to take our coin out of the country by making it more expensive to take bars. We had better furnish the raw material than the manufactured article. These bars will have to be shipped, melted and worked into coin at some waste and considerable expense to replace the coin exported, while the bars would have served every purpose for export. The export charge was put on bars several years ago, when gold exports were heavy, and some means to discourage them was sought. When the current coin is abraded exporters will pay a slight premium to get bars which are full weight, but our current gold coin is now largely new, and on the average close to the standard, and exporters are preferring to ship it rather than to pay the bar charge."

Latest Mining and Metallurgical Patents.

Patents Issued Jan. 2, 1899.

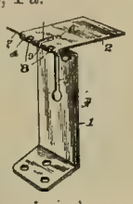
Specially Reported for the MINING AND SCIENTIFIC PRESS.

ROCK DRILL.—No. 640,341; G. D. Whitcomb, Glendora, Cal., and W. K. Milholland, Chicago, Ill.



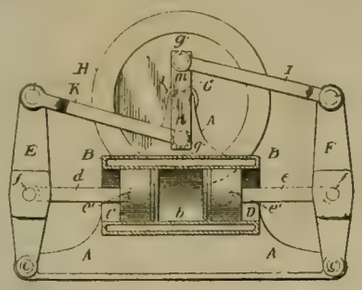
A fluid-actuated rock drill, in combination, a cylinder, a piston reciprocating therein and carrying a drill bar, a valve chest, ports leading from chest to the opposite ends of the cylinder; an angular rotating bar on the axis of the cylinder and in sliding engagement with the piston, a ratchet wheel fixed upon the rotating bar and having teeth on its disk face, an annular pawl concentric with such bar and having annularly arranged teeth for co-operating with the teeth on the ratchet, a spring for forcing the pawl into engagement with the ratchet, an arm projecting radially from the pawl, a piston for oscillating the pawl, such piston having a transverse recess and a shoe reciprocating therein, with which shoe the arm of the pawl is pivotally engaged; a cylinder within which the last named piston reciprocates, ports leading from the valve chest to the opposite ends of the last named cylinder, a valve for simultaneously controlling the ports of both cylinders, and motor for shifting the valve.

BRACKET FOR MINERS' LAMPS.—No. 640,387; T. R. Jones, Wilkes-Barre, Pa.



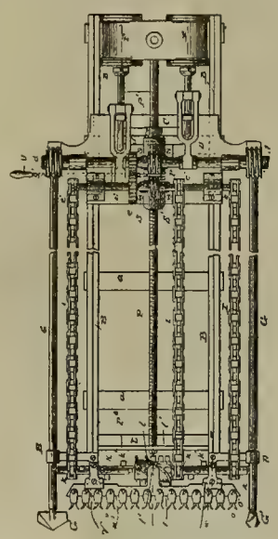
A lamp bracket for miners' caps having a bend in its upper portion and eyes formed thereon, a slot extending through bend and adapted to receive the shank of lamp hook and an opening in the rear of slot for the point of the hook, in combination with a lamp retaining device consisting of a wire or pin removably arranged within eyes and extending across slot.

MOTIVE POWER.—No. 640,710; J. A. Secor, New York, N. Y.



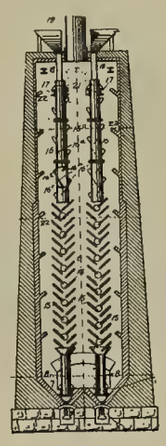
Combination with bedplate, cylinder bedded thereon with the ends of the bedplate extended beyond the end of the cylinder, duplicate pistons arranged for movement in opposite directions within the cylinder, and a crankshaft the cranks of which extend in opposite directions, of levers fulcrumed at their lower extremities to the extended ends of the bedplate, crankrods which connect the free ends of the levers with the cranks of the crankshaft, and connecting rods which connect the pistons with the levers at points between their fulcra and their pivotal connections with the crankrods.

MINING MACHINE.—No. 640,621; A. Bailey, Philipsburg, Pa.



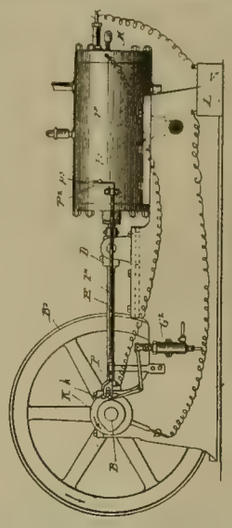
A mining machine, combination with bed, carriage, two reciprocating cutters each forming a separate kerf and means for simultaneously reciprocating cutters in opposite directions whereby they balance the machine laterally, of a drill mounted on each side of the carriage and forming an aperture at the end of the kerf.

VERTICAL AUTOMATIC DRYING AND ROASTING FURNACE.—No. 640,715; J. Stoveken, Milwaukee, Wis.



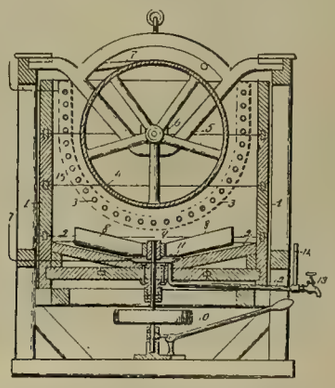
Combination with vertical ore roasting chamber having an ore inlet at the top and a discharge opening at the bottom, of means for maintaining a vertical column of ore between these two openings and in a central position in the roasting chamber, whereby the heat is allowed to pass upward around the ore, comprising inclined shelves supported by the furnace walls, and located in the lower part of the furnace, the wall of the chamber being provided with openings opposite the ore supporting means to permit access to the column of ore, and detachable plugs normally closing openings.

GAS ENGINE IGNITER.—No. 640,392; G. W. Lewis, Philadelphia, Pa.



A gas engine having an electrical sparking device or devices, a bifurcated contact piece one arm of which is adapted to be temporarily moved into position for completing the circuit through a revolving contact when the crank arm is past the dead center, the other arm of the bifurcated electrode being permanently in position to give electrical contact when the crank arm is approaching the dead center in the direction of its operative revolutions, in combination with means for breaking the circuit within the cylinder by hand.

PROCESS OF EXTRACTING PRECIOUS METALS.—No. 640,718; C. P. Tatro and G. Delius, Seattle, Wash.



Separating precious metals from ores, process comprising following steps: reducing the ore to a fine pulp; dissolving the metals from the foreign matter by immersing and agitating the pulp in a bath comprising an aqueous solution of common salt, a small percentage of bromine, caustic lime and other reagents for precipitating undesirable metals from the electrolyte; gathering a portion of the precious metals from the bath by revolving a cathode drum partially immersed in bath while latter is in contact with an anode, at the same time scraping the metallic deposit from the drum, also simultaneously depositing other portions of the precious metals in the same bath upon a cathode of sodium amalgam, an electric current passing through anode, cathodes and bath and during third step of the operation.

PROCESS OF MAKING SMOKELESS POWER.—No. 640,213; H. Maxim and R. C. Schupphaus, New York, N. Y.

Pulping or reducing a pyroxyline to a fine state of division, then treating it with a solvent, and before it is completely freed from the solvent treating it with a size, then granulating and drying.

CANADIAN silver coins in Spokane and Sound cities pass at their par value, as does the American silver on the Canadian side of the boundary. Oregon and California banks discount Canadian bills 1% or 2%; a greater discount is made on silver, a Canadian quarter passing for 20 cents, a discount of 20%. Anywhere along the boundary line the silver coins of both countries pass on an equal footing, for there is very little difference in their value, and people keep crossing back and forth across the boundary.

A Water Wheel Plant.

The water wheel plant installed in the pumping station of the city of Columbus, Ohio, by the American Impulse Wheel Company of New York consists of two impulse water wheels, each direct connected to a Western Electric 120-light arc dynamo. The surplus capacity of the pumps supplying the city with water was used for furnishing water to the wheels at seventy pounds pressure. The high speed required for direct connection necessitated the use of wheel runners of very small diameter for the power furnished, six 18-inch runners being used in each unit with three nozzles to each runner, making eighteen nozzles in all.

Fig. 1 shows the arrangement of receiver and piping for conveying the water to the six runners. The large number of nozzles precluded the use of contracting nozzles, because of their high cost and of the complicated gearing necessary for connecting them to the governor. Six butterfly valves, one to each runner, were accordingly used, and the effect of the low efficiency of a partly closed butterfly valve in reducing the total efficiency of the machine was neutralized in the following manner:

As shown in Fig. 1, six cams were so arranged on a shaft connected by a gear to the governor as to close the valves one after the other, each valve remaining wide open until the next preceding valve is completely closed. Thus only one of the six valves is partly closed at any time, all the others either being entirely closed or entirely open. There are thus six valves of the load giving a maximum jet efficiency and all of the valves in action, except one, are always working at their maximum efficiency. The strict speed regulation requirements and the small diameter of the runners made necessary the use of a heavy flywheel. The high speed precluded the use of the ordinary cast-iron flywheel and it was therefore made of a heavy steel rim shrunk onto a cast-iron web. A mechanical relay governor was used for actuating the cam mechanism.

The water chamber is cast in two pieces, and is connected to the valve chambers by means of long turn elbows, as shown in Fig. 1, the valve stems coming down through the bottom of the valve chambers and being connected to the cams by means of a lever arm and roller pin. The governor is placed on an extension of the cast iron base of the wheel, power for actuating the cam being derived from a small pulley on an extension of the wheel shaft. The wheel base was also extended at the other end to receive the dynamo, the whole plant being compact and self-contained, an arrangement rendered necessary by the very limited space available.

The base by which the nozzle chambers are also supported is of cast iron and is arranged to carry off all the water that may condense on the outside of the casing. The casing is of riveted boiler iron, built in two parts, bolted together, the upper part being provided with eye bolts for lifting. The bearings are ring oiling and spherical seated.

This plant has now been running for over a year, supplying light to the surrounding districts.

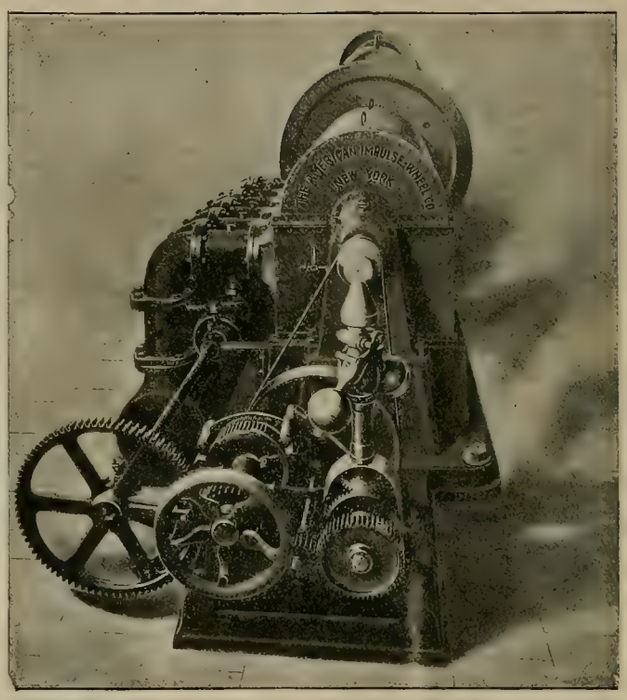
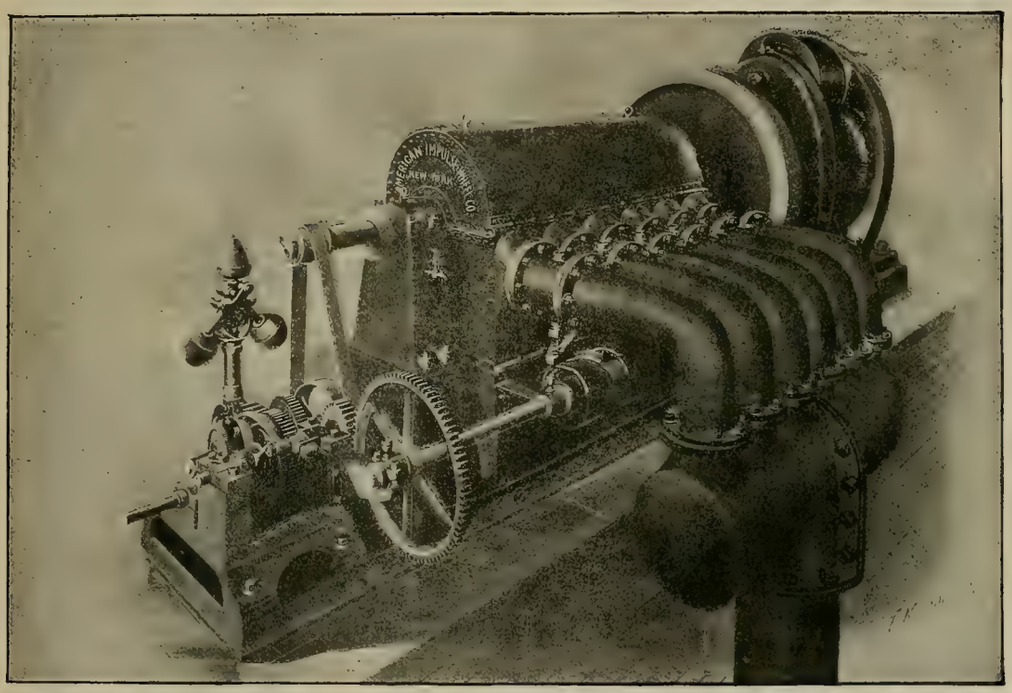
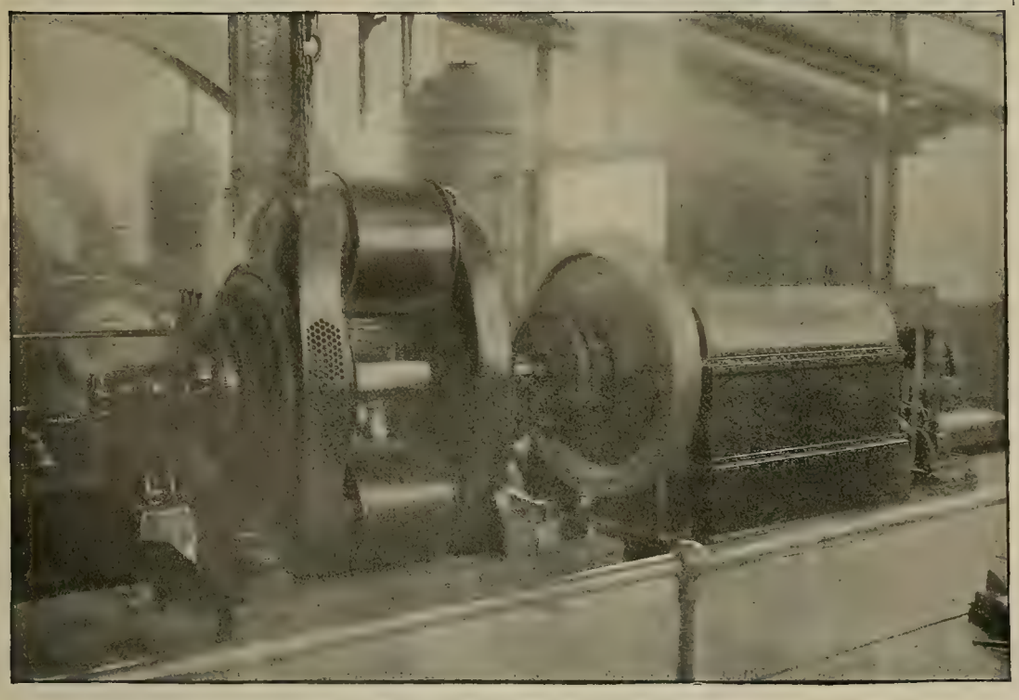


Fig. 1.—Arrangement of Receiver and Piping.





Water Wheel Plant Installed at Columbus, Ohio.

Price List of Leather Belting.

Following is the list on leather belting adopted by the Leather Belting Manufacturers' Association at their last annual meeting, held in New York City:

Width, inches.	Price per ft.	Width, inches.	Price per ft.	Width, inches.	Price per ft.
½	$0 8	5½	$1 01	23	$4 26
⅝	10	6	1 11	24	4 44
¾	12	6½	1 20	25	4 63
⅞	13	7	1 30	26	4 81
1	14	8	1 48	27	5 00
1¼	19	9	1 67	28	5 18
1½	24	10	1 85	30	5 55
1¾	20	11	2 04	32	5 92
2	34	12	2 22	34	6 29
2¼	39	13	2 41	36	6 66
2½	43	14	2 59	40	7 40
2¾	48	15	2 78	44	8 14
3	53	16	2 96	48	8 88
3¼	58	17	3 15	52	9 62
3½	63	18	3 33	56	10 36
3¾	67	19	3 52	60	11 10
4	72	20	3 70	64	11 84
4½	82	21	3 89	68	12 58
5	91	22	4 07	72	13 32

Double belts twice the price of single; intermediate widths at proportionate prices; special belts, special price.

ROUND AND FLAT BELTING.			RAWHIDE ROPE.	
	Flat,	Round,	Inch.	Cents.
Inch.	cents.	cents.	½	28
⅛	18	20	⅝	22
3/16	28	30	¾	33
¼	38	38	⅞	42
5/16	44	46	1	50
⅜	60		1	58

Silver-Manganiferous Iron Ore.

Statistics regarding the production of manganiferous iron ores in Leadville, Colo., are given in Charles D. Wolcott's report on the production of metals, as Director of the United States Geological Snrvey.

A distinctive schedule shows the production of manganiferous iron carrying silver of over seven ounces per ton, which is shipped to the smelters, and the manganiferous iron ore containing less than seven ounces of silver, which is shipped to Pueblo or Chicago, where it is used in the manufacture of Bessemer steel. The mining of manganiferous or non-silver bearing iron ore, began in 1890, when 2075 tons were shipped to Chicago. The production grew steadily until, in 1898, the output is given at 18,848 tons. In the same nine years, beginning with 1889 and ending with 1898, the amount of argentiferous, or silver-bearing manganiferous iron, increased in production at Leadville from 64,987 to 99,651 tons. For the mining of manganiferous iron it should not contain more than $\frac{55}{1000}$ of 1% of phosphorous, as a greater amount than that is detrimental in the manufacture of steel, and the companies who purchase it will tax the purchaser 1 cent for every one-thousandth of 1% of phosphorous it carries in excess of that amount.

Mine Ventilation.

No problem with which the miner has to contend is of greater importance than that of ventilation, and in many cases too little attention is given the matter, either theoretically or practically.

The following remarks are condensed from a paper written by James Grant of Victoria and published in the Australian Mining Standard:

As long as bad ventilation was a mining question the world bore it with resignation as something unavoidable. But when it was found that the railway tunnels, through which the public had to travel, were badly ventilated—some of them being dangerous to human life—it became a different question altogether.

There are three methods employed—natural ventilation, furnace ventilation, and machine ventilation, either plenum or exhaust. Natural ventilation depends upon the inequality of weight betwixt two columns of air, the heavier of which displaces the latter. This is exemplified in the action of chimneys and in the ventilation of dwellings, and its efficiency is affected by friction in the airways. In mines it is very effective in level free workings where a tunnel connects with a shaft or winze on a vein; but where mines have to be wrought by deep shafts it is not so reliable. There the motive power, inequality of height in the air columns, being usually very little, and the extent of rubbing surface creating friction being very great, causes the current to be feeble and unreliable, and as a result the mine is badly ventilated. This is especially the case where carbon dioxide is the prevailing impurity, which stagnates on the floors of the mines and in winzes, even when a current exists. The stagnation of carbon dioxide is caused by the absence of any force corresponding to solar radiation on the surface of the earth.

In a deep mine the high temperatures and humidity that prevail are very prejudicial to ventilation. Besides the actual carbon dioxide, the displacement and rarefaction of the pure air constituents may cause a much greater deficiency of oxygen than is owing to the excess of carbon dioxide alone; and the nearer the temperature rises to that of blood heat the less readily will the respired air from the lungs rise and flow away with any current that may exist. A common temperature in badly ventilated deep mines is 90° Fahr., or thereabouts.

The cooler the incoming surface air is the more readily will the noxious gases evolved flow away; but when the pure air is heated to a high degree the noxious gases lose their comparative buoyancy, and, sinking down, become stagnant. This was found out at an early period, and furnace ventilation was introduced on the continent centuries ago to remedy it.

Fan ventilation was also introduced in Germany in the year 1621, but the early efforts in that direction do not seem to have been satisfactory. Furnace ventilation is capable of being made effective from a very great depth, but there should be two shafts to ensure the greatest efficiency. However, this method of ventilation can never be satisfactory in gold mines, owing to the cost of fuel. It was held by Atkinson and other eminent mine engineers in England that the furnace was superior to the fan as a ventilating agent, especially at depths below 900 yards.

There is one form of furnace ventilation sometimes spoken of as being exceptionally clever, namely, to run an air pipe under the grate of a steam boiler, closing the ash pit thoroughly. This is considered to kill two birds with one stone—to ventilate the mine and get up steam. This was introduced at the Chicago water works in 1867 to ventilate the tunnel that goes under Lake Michigan. There were sixteen to eighteen men employed in each shift—no blasting—and some mules kept below. The smoke from the candles, the respired air, with the perspiration from the men and mules, formed a mist so thick that the engineers could not see to align the tunnel in working hours, although after a Sunday's or holiday's spell the air got so clear that the light of a candle could be distinctly seen at a distance of 2000 feet. A fan was ultimately installed and an engine erected to drive it. The former is the most stupid method of ventilation I know of. It ought—in contradistinction to the terms natural and forced draught—to be called strangled draught, for the beauty of it is that the friction in the air pipe acts in opposition to the draught in the chimney, and you have only to make the air pipe long enough to stop all draught whatsoever as effectually as a damper would.

Another plan is to employ a jet of compressed air, as is done with the exhaust steam in locomotives. This was tried by General Morin, the French ventilating engineer, with an efficiency of $\frac{1}{28}$ of the theoretic power of the jet of air, or, taking the efficiency of the compressed air at 50% of the steam power, 1.78% of the actual force of the steam. Jets of steam and water have also a low efficiency. We may, then, take fans as the most efficient ventilators. Some of them are credited with over 70% of efficiency. But there is a great misapprehension as to the respective merits of various fans or blowers as ventilators. It is not the fan or other agent that ventilates, but the current of air induced. One fan or blower may be more effective or economical than another, but the currents of air induced will—velocity and volume being equal—be exactly the same. If a current of air induced by one agent does not give satisfaction, no current of the same volume and velocity induced by any other type of agent will make any difference; a remedy must be sought in another direction. Another misapprehension that exists is that the current of pure air will drive the foul air out of the mine before it. That is a mistake. What a current of pure air does in a space filled with foul air is to make a bee line through it to the nearest avenue of escape, carrying a portion of the impurity with it—but only a portion, so that, as one practical observer said apropos of the trials of the Massie scheme, "it takes the best air out of the mine." It just acts as a river would do—floats along material lighter than itself, and scours out a portion of the heavier material with which it comes in contact. That this is its action is indisputably shown by an observation made by Prof. Mica Smith at the Beaconsfield mine when all the men were driven out by foul air. The air issuing from the exhaust showed by analysis 1.07% of carbon dioxide. If we suppose the average proportion of carbon dioxide in the mine air to have been 3%, then the current of pure air must have taken up about one-half of its volume of the dense foul air of the mine, which I consider to be very good work indeed.

Another proof lies in the fact that in many mines the air is never clear of smoke from week's end to week's end, like the Chicago tunnel. But on Sunday it all clears out, and on Monday morning the air is perfectly clear. That is because in the working time the impurity is added to as fast as it is being removed, so that there is no real improvement; but on Sunday the production is stopped, while the work of purification is still going on. In the British coal mines the reason given for only working two shifts was that unless the mines got a spell during the third possible shift they would become unworkable, which indicates an excess accumulation of carbon dioxide in working hours. Coal miners assume that because a current of air takes out firedamp effectively it will also take out carbon dioxide as well, but that is a fallacy which has been proven indisputably in the ventilation of railway tunnels. For in these, although currents of air calculated to clear out all the gases of combustion have been passed through, they have failed to have the desired effect. The reason is obvious. The great bulk of the pure air passed along the upper part of the tunnel, taking with it only a portion of the noxious gases, as noted in the case of the Beaconsfield mine, leaving the remainder lying on the floor of the tunnel. Prof. Mica Smith notes a similar occurrence in his report on the Allendale mines. A thorough draft had been established between two shafts in one mine, and two mines had been connected, yet in neither case was there any improvement, although the current was so strong as to render it difficult to keep the candles burning. This may seem incredible, yet it is quite consistent with what I have pointed out in the comparison of air respired from the lungs and mine air of high temperature. It is possible that in summer the fresh air at a high temperature may pass over the foul air in the mines and leave it practically unchanged. There is no doubt that is the case with many mines at the present time, the small quantity of fresh air forced in being insufficient to do more than keep the proportion of impurity in a state of statu quo. Even when the noxious gas is diffused through the current of air it does not follow that it will be carried along as buoyant material would be carried by a current of water.

Construction of an Upraise.

Written for the MINING AND SCIENTIFIC PRESS by F. SLETCHER.

A rather peculiar 450-foot upraise in the Summit mine, the property of the Marina Marsicano G. M. Co., in Shasta county, Cal., was recently completed by Mr. L. F. Barlow, contractor, a description of which may be interesting to those of your readers who are operating power drills and conduct underground mining generally:

The croppings of the Summit vein trend along the east side of the crest of a ridge at an altitude of about 2200 feet. The course of the vein is nearly north and south, dip 80° east. The predominating country rock is apparently a hard, tough, diabase, schistose in places, and often resembling chert.

The principal workings of former owners consisted of a crosscut tunnel (adit), 200 feet in length, driven to the vein from the east. The ore body intersected was found to extend some 400 linear feet north and nearly 100 feet high. The pay ore extracted occurred in kidneys of base ochre (red brown oxide of iron) ore, and yielded at reduction works shipped to at the rate of $290 in gold per ton.

The present owners intersected the vein with a lower tunnel 1100 feet long—some 128 feet north (horizontally) of and 319 feet lower (perpendicularly) than the upper old tunnel. Levels were then run on the vein north and south, showing fairly good walls from 3 feet to 9 feet apart, still containing similar ochre ore as above. One hundred and ninety feet north of where the lower tunnel intersects the vein a small but high-grade ore body was stoped for 30 feet in height, being apparently a sectional continuation of the ore met in the upper tunnel. For this and other obvious reasons it was determined to begin a working raise here on the vein and connect it with where the upper tunnel intersects the vein—a linear angle (north and south) of 45° (451 feet), and lateral angle (east and west) of 80° (56 feet).

Mr. Barlow accepted the contract and completed the raise in sixty-five working days, at the rate of 7 feet per twenty-four hours, with eighteen men employed in eight-hour shifts.

From the dump to the foot of the raise is nearly 1500 feet, over a T-rail track, cars run by hand.

A station was cut at the foot of the raise and provided with a rock bin and chute, from which the car was loaded. The raise is 6 feet high by 7½ feet wide, separated into a 3x6-foot and 4½x6-foot compartment, the two being divided by a strong post every 5 feet, to which lagging were nailed inside of the 3-foot dumping compartment. In the 4½x6-foot compartment is an 18-inch track of T rails, on which a truck conveyed materials, tools and machine to the face (head) of the raise, where a ½-inch wire rope ran over a single block hitched to a cross timber, being operated by a 6x8 compressed air hoist at the station. In the same compartment were also an 8-inch galvanized air pipe, two 2-inch pipes carrying compressed air to the 2¾-inch drill machine, and a ¾-inch pipe conducting water under 350 feet pressure to clean drill holes.

At the mouth of the lower tunnel a boiler furnished steam for all the motive machinery, consisting of: A two-pipe air compressor having an 8-inch air cylinder with 9-inch stroke, making eighty revolutions per minute.

The distinctive peculiarity of the double-pipe compressed air system is that it requires two pipes to conduct the air to and from the drill machine.

Mr. Barlow, who has had considerable practical experience in machine drilling, prefers the double-pipe system to any other he is conversant with, on account of its reliability and ease in operating, saving not less than 30% power, of less weight and requiring less space, and less cost of plant. He asserts that cost, placing and keeping in order the extra small pipe is too insignificant to compare with the numerous economical advantages obtained by the two-pipe system.

The additional machinery were a 6 H. P. engine driving a blower for smoke-expelling purposes, carrying the air in an 8-inch pipe continuously; a small duplex steam pump, elevating the tunnel water 350 feet high to a tank on the hillside above, from which a ¾-inch pipe connected, through the tunnel, with the raise, where the water was utilized to clean drill holes.

Three-fourths of a cord of oak wood per twenty-four hours was used to produce steam for all purposes.

Ten holes, 4 feet deep each, consuming thirty pounds of No. 2 giant powder, generally constituted a round, the broken rock descending, through the dumping compartment of the raise, to the rock bin at the station by gravity.

Colorado Coal Statistics for 1899.

Specially Prepared for the MINING AND SCIENTIFIC PRESS by HARRY A. LEE, Commissioner of Mines for Colorado.

BRIEF STATISTICS, 1899.

Number of mines in operation	88
Total tonnage of coal produced	4,806,879
Number of men employed	7,321
Number of fatal accidents	41
Number of men employed for each life lost	178
Tons of coal mined for each life lost	117,241
Number of non-fatal accidents	97
Number of men employed for each non-fatal accident	75
Tons of coal mined for each non-fatal accident	49,555

PRODUCTION BY COUNTIES, SHOWING INCREASE AND DECREASE.

Counties.	1898.	1899.
Arapahoe	514	439
Boulder	491,503	582,662
El Paso	48,388	68,729
Fremont	437,086	629,325
Gunnison	361,113	303,685
Garfield	240,981	132,086
Huerfano	553,196	606,615
Jefferson	11,925	8,551
Las Animas	1,684,183	2,122,345
La Plata	107,705	116,577
Larimer	2,843	5,500
Mesa	19,167	23,822
Pitkin	182,927	176,106
Weld	22,506	31,436
Totals	4,164,037	4,806,879
Increase for 1899		642,842

COKE PRODUCTION FOR 1899.

Location of Ovens.	County.	Number of Ovens.	Tonnage.
Starkville	Las Animas	134	56,177
Sopris	Las Animas	221	105,376
Cardiff	Garfield	199	68,458
El Moro	Las Animas	230	121,657
Crested Butte	Gunnison	154	54,178
Gray Creek	Las Animas	78	19,029
Hastings	Las Animas	100	30,908
Totals		1,123	455,783

Quicksilver Recovery from Greasy Refuse.

Written for the MINING AND SCIENTIFIC PRESS by D. B. HUNTLEY.

In cleaning up the old DeLamar pan amalgamating mill a year ago, the management had a peculiar experience which is given for the benefit of others who may face similar conditions.

Under the pan line shaft there had accumulated piles of dirty grease, the drippings of oil from the pan shaft and line shaft bearings and of compound from the pan-driving spur gear. This grease was full of small globules of quicksilver from leaking pan bottoms above. Every old-time mill man has seen such a combination, much to his disgust.

The accumulations of this material for eight years under twenty-eight pans were of so large an amount that some method of treatment had to be devised. The richer parts of the greasy mass contained 10% to 40% of quicksilver and assayed hundreds of dollars per ton in gold and silver. No smelter would treat it, not caring to salivate their employes.

After several unsuccessful attempts to handle portions of this mass, the following course was adopted: The least greasy or poorer portion of the slime collected under the pans was dumped into a settler, the muller being kept in motion and a large stream of water running in and out. The muller was raised as found necessary to accommodate the increasing layer of heavy sand, etc., at the bottom, while the light slime and some of the free oil floated away.

The entire bulk of mud, sand, grease and quicksilver thus concentrated was wheeled to a patch of hard ground in the mill yard and allowed to sun dry for some weeks. It was then put through a screen of 1-inch mesh which separated the large lumps of grease, and by mixing the moist grease with the sand and mud it became lumpy enough to be easily handled. The lumps were stored in boxes. The fine material was again sun dried and screened through a ¼-inch mesh screen, being beaten and rubbed on the screen to get rid of all the sand possible. The small, greasy lumps were added to that already stored in boxes.

The sand that passed through the ¼-inch mesh screen was washed over 16 feet of ordinary silver-plated copper plates which caught the quicksilver and amalgam. It seemed very queer to a mill man to see the mixture of oil, grease and muddy water running over copper plates, and see drops of quicksilver and specks of amalgam catching easily on the plate; but they did so. It was found better to clean off the plates every half or three-quarters of an hour with a rubber, as is usual in gold mills, and then to give them a mopping with lye or cyanide solution. We used both without notably different results. The quicksilver ran down the copper plates, keeping them very "wet," and dropped off at the lower edge where it was caught in tight riffles. After passing over the plates the sand was found to be free from quicksilver and amalgam, but the very small, greasy lumps still contained a considerable value. This mixture of sand and greasy lumps could not be handled in an amalgamating pan with a large quantity of lye added. That was tried, without other result than to aggregate some small lumps into larger ones and to enrich them from the quicksilver employed. Having no roasting furnace, this fine material was therefore allowed to go to waste. Many hundred pounds of quicksilver and considerable amalgam were secured cheaply and quickly by a simple washing of the sand over copper plates as above described.

The boxes of greasy lumps were burned in a rude improvised furnace. Some old castings were used to make a semi-circular furnace 4 feet in radius and 6 feet long. Old grate bars were used and the ends bricked up, leaving space for one small feed and ash door at one end and one 8-inch smoke pipe at the other. The 8-inch galvanized-iron smoke pipe ran horizontally for about 25 feet and then entered an old sheet-iron drum 3 feet in diameter by 10 feet long, for a condensing chamber. A spray of water from an adjacent creek kept the condensing chamber and the horizontal 8-inch pipe cool. A fire of wood splinters and charcoal was made on the grate bars, and then lumps of the greasy material, perhaps seventy-five pounds at a time, scattered over the fire. The oil burned out; the quicksilver volatilized and much of it condensed in the pipe, and the rich, burned-out lumps of sand dropped through the grate bars into the ash pit. One laborer attended the furnace and usually burned 500 pounds per day. The laborers employed here were paid extra, were furnished with a respirator and changed works with others each two days, to keep from becoming salivated. (It has been a general rule of this place that salivated mill men were given work as carmen in some hot place in the mine and profuse perspiration soon made them in good form again.)

The ashes and several tons of sand from this rude furnace were screened and hand-sorted to separate the copper rivets, bolts, pebbles, etc., and shipped to smelters where it netted $900 to $1200 per ton in gold and silver. A few hundred pounds of deformed copper rivets and burrs were thus collected for sale to copper smelting works.

The quicksilver did not condense in the rude condenser to liquid quicksilver. It deposited more on the walls of the pipe than in the entire condensing chamber. It was in thick crusts or layers of greasy masses, 1 to 2 inches thick of minute quicksilver globules mixed with soot from the smoky fire. This, I suppose, is the "stupp" of the quicksilver metallurgists. Thousands of pounds of this "stupp" accumulated and was stored in cast-iron boxes. The condenser pipe required cleaning every two or three days. We had much trouble reducing the greasy "stupp" to clean liquid quicksilver. We tried agitation with acids, lye and lime without success. Finally it was retorted in large silver-mill retorts. These treated it successfully. A small percentage of greasy quicksilver globules that passed through the retort had to be re-retorted. The black, sooty residue from the retort was bulky and very light. It assayed about $500 in gold and silver and was sold to smelters with the sand. In the above way about eighty flasks of quicksilver were recovered, while doubtless a considerable percentage escaped condensation. The above metallurgical treatment was very wasteful, yet probably a more expensive condensing plant, counting the cost of such a plant, would not have yielded the net profit that was secured.



Views in Esmeralda County, Nevada.

In such rude ways as above mentioned the cleanup of the DeLamar mill, outside of the pans and settlers, secured a total of 8160 pounds of quicksilver, 24¾ tons of sand and 1866 1/10 ounces of gold and silver bullion, at a cost of $3731.18 and which realized a profit of $20,837.84.

Tungsten and Molybdenum Steel.

Steel alloyed with a small proportion of tungsten has been used for some years in the manufacture of tools and other articles requiring a hard and tough metal. Some years ago Prof. V. Leepin of St. Petersburg, Russia, suggested that molybdenum might be used for the same purpose, as it strongly resembles tungsten in its properties. After some discussion he succeeded in having molybdenum steel made at the Pubilov Iron Works, and carried on a number of tests, the results of which were published in the Russian Mining Journal for 1897. In making these tests great pains were taken to have the steel, both tungsten and molybdenum, made under the same conditions. Both steels were made in Siemens regenerative furnaces from a charge consisting for the molybdenum steel of 20.6 kilograms of basic open-hearth steel, 2 kilograms Swedish charcoal pig iron, 2.3 kilograms Swedish charcoal blooms, 0.1 kilogram ferro-silicon, and 1 kilogram molybdenum in a metallic form, but combined with a small quantity of carbon. For the tungsten steel the charge consisted of 16 kilograms basic open-hearth steel, 3.7 kilograms Swedish pig iron, 2.9 kilograms Swedish charcoal blooms, 0.1 kilogram ferro-silicon, and 1.8 kilograms ferro-tungsten having 48% tungsten. Both steels were cast into ingots, which were afterwards rolled into rods of a suitable size for the testing machine. By analysis the percentage of tungsten was found to be 3.8 and that of molybdenum 3.7.

The experiment showed that the molybdenum steel is somewhat softer than the tungsten steel. Oil tempering and high heating after hardening increased the limit of elasticity in the molybdenum steel. Common tempering in oil has a greater influence on the tungsten steel than on the molybdenum, but, on the other hand, the molybdenum steel was stronger than the tungsten after heating and hardening in water. Tungsten steel was more apt to split than the other when worked, and broke sooner when bent cold.

In many respects the properties of the two kinds of steel were very similar, but the molybdenum steel seems to stand forging and hardening better, showing that in some cases it may furnish a better metal than the tungsten steel.

We have heretofore referred to the use of molybdenum, tungsten and some other of the rarer metals in the processes for making armor plate at the Krupp works in Germany and the Creusot works in France. At both these establishments the alloys are kept secret, but it is probable that a mixture of several of the rarer metals is used, including both tungsten and molybdenum.—Journal Franklin Institute.

In the Great Basin.

Mining has been the principal industry in that vast region lying between the Rocky mountains and the Sierra Nevada called the Great Basin. The name is somewhat misleading, as the high plateau country lying between these two great ranges of mountains is scarred by numerous mountain ranges, between which lie fertile valleys or wood and plains; but nearly every hill is the site of a prospector's hopes, and some of the greatest mines of the West have been developed in this wilderness of rugged hills and alkali flats.

Esmeralda county, in western Nevada, is typical of the region as a whole, and the accompanying illustration conveys an idea of the appearance of the country. In this county mining brought about the settlement of the county and is still the chief industry. At one time it was a noted silver producer, but, with the decline of the white metal, gold mining grew more active and many veins have been discovered and developed. The Silver Peak district is one of the most noted in the county. There are found veins 100 feet and more in width containing good values, but the property lies idle, owing to litigation.

Recently attention has been attracted to Esmeralda by reason of the discovery of new gold ledges and also of large copper deposits near Hawthorne. These are being developed and the outlook for a revival of mining in Esmeralda county looks promising.

A RECENT amendment to the mining law of British Columbia provides that the owners, agents or managers of every mine shall make yearly returns to the Bureau of Mines of the quantity of metal or ore wrought in their properties, and the number of persons employed above and below ground. The individual returns will not be published by the department without the consent of the owners, nor will the figures be available to the public save in the aggregate as given in the departmental publications, the information being intended for statistical purposes only. A maximum fine of $100 may be imposed for failure to comply with these regulations.

MINING SUMMARY.

Precious Metal Product for 1899.

ANNUAL PRODUCTS OF LEAD, COPPER, SILVER AND GOLD IN THE STATES AND TERRITORIES WEST OF THE MISSOURI RIVER, INCLUDING BRITISH COLUMBIA AND YUKON TERRITORY, 1870-1899.

YEAR.	Product as per W. F. & Co. statements, including amounts from British Columbia and west coast of Mexico.	Product after deducting amounts from British Columbia and west coast of Mexico.	The Net Products of the States and Territories West of the Missouri River, Exclusive of British Columbia and Yukon Territory, Divided, are as follows:			
			LEAD.	COPPER.	SILVER.	GOLD.
1870	$ 54,000,000	$ 52,150,000	$ 1,080,000	.....	$17,320,000	$33,750,000
1871	58,284,000	55,784 000	2,100,000	.....	19,286,000	34,398,000
1872	62,236,950	60,351,824	2,250,000	.....	19,924,429	38,177,395
1873	72,258,698	70,139,860	3,450 000	.....	27,483 302	39,206,558
1874	74,401,045	71,965,610	3,800,000	.....	29,600,122	38,466,488
1875	80,889,057	76,703,433	5,100,000	.....	31,635,239	39,968,194
1876	90,875,173	87,219,850	5,040,000	.....	39,292,924	42,886,035
1877	98,421,754	95,811,582	5,085,250	.....	45,846,109	44,880,223
1878	81,154,628	78,276,167	3,452,000	.....	37,248,137	37,576,030
1879	75,349,501	72,688,888	4,185,769	.....	37,032,857	31,470,262
1880	80,167,936	77,252,512	5,742,300	$ 808,000	38,033,055	32,559,057
1881	84,501,417	81,198,474	6,361,902	1,195,000	42,987,613	30,653,959
1882	92,411,835	89,207,540	8,008,155	4,055,037	48,133,039	29,011,318
1883	90,313,612	84,039,212	8,163,850	5,683,921	42,975,101	27,816,610
1884	84,975,954	81,633,835	6,834,001	6,086,252	43,529,925	25,183,567
1885	90,181,260	87,311,362	8,562,991	7,838,036	44,516,599	26,393,756
1886	103,011,761	100,160 222	9,185,192	9,276,755	52,136,851	29,561,424
1887	104,645,950	103,327,770	9,631,073	10,362,716	50,833,884	32,500,067
1888	114,341,592	112,665 569	11,263,630	18,261,490	53,152,747	29,987,702
1889	127,677,896	126,723,284	14,593,323	14,703,763	64,898,637	32,527,561
1890	127,166,410	126,804,855	11,509,571	20,569,092	62,930 831	31,795,361
1891	118,237,441	117,946,565	12,385,780	13,201,663	60,614,004	31,685,118
1892	111,531,700	111,259,508	11,433,947	19,370,516	50,607,601	29,847,444
1893	104,081,591	103,827,623	7,756,040	23,631,339	38,491,521	33,948,723
1894	105,113,489	104,844,112	8,223,513	22,276,294	28,721,014	45,623,291
1895	118,164,642	117,896,988	7,170,367	27,052,115	35,274,777	48,399,729
1896	126,289,538	121,949,536	6,536,026	28,713,305	33,684,963	53,015,242
1897	153,435,489	142,853,469	8,775,144	36,388,694	34,034,034	63,655,597
1898	177,022,666	150,359,406	11,894,251	45,897,648	35,081,365	66,486,202
1899	203,541,907	170,678,966	13,667,248	58,849,994	34,594,498	72,567,226

The exports of silver during the past year to Japan, China, the Straits, etc., have been as follows: From London, $33,923,252; from San Francisco, $5,963,543; total, $39,886,795, as against $32,622,032 last year. Pounds sterling estimated at $4.8665.

STATES AND TERRITORIES.	Gold Dust and Bullion.	Silver Bullion by Express.	Ores and Base Bullion by Freight.	Total.
California	$15,391,498	$315,304	$3,246,315	$18,953,117
Nevada	2,294,343	600,672	14,400	2,909,415
Oregon	1,780,910	75,423	3,560	1,859,893
Washington	380,840	175,200	73,125	609,165
Alaska	4,645,646	.....	195,200	4,740,846
Idaho	2,495,210	4,235,150	6,006,500	12,736,860
Montana	5,187,500	8,725,000	36,802,500	50,695,000
Utah	3,681,407	132,775	9,950,500	13,654,682
Colorado	26,348,050	13,344,596	3,488,267	43,180,913
New Mexico	674,612	100,262	1,543,084	2,317,958
Arizona	2,965,160	739,113	16,659,148	20,363,421
South Dakota	6,750,000	250,720	46,000	7,046,720
Texas	3,100	290,200	.....	293,300
Wyoming	208,950	23,600	85,126	317,676
Br. Columbia and Yukon Ter'y	17,622,941	4,210,000	2,030,000	23,862,941
Totals	$90,190,167	$33,208,015	$80,143,725	$203,541,907

The gross yield for 1899, as shown above, segregated, is approximately as follows:

Gold	44 31-100	$ 90,190,167
Silver	19 7-100	38,804,498
Copper	29 11-100	59,244,994
Lead	7 51-100	15,302,248
Total		$203,541,907

MEXICO.

STATEMENT OF THE PRODUCT OF GOLD AND SILVER IN THE REPUBLIC OF MEXICO, REVISED AND CORRECTED FROM 1877 TO 1899.—VALUES UPON MINTAGE BASIS.

Years.	Gold.	Silver.	Total.
1877-1878	$747,000	$24,837,000	$25 584,000
1878-1879	881,000	25,125,000	26,006,000
1879-1880	942,000	26,800,000	27 742,000
1880-1881	1,013,000	29,234,000	30,247,000
1881-1882	937,000	29.329,000	30,266,000
1882-1883	956,000	29,569,000	30,525,000
1883-1884	1,055,000	31,695,000	32,750,000
1884-1885	914,000	33,226,000	34,140,000
1885-1886	1,026,000	34,112,000	35,138,000
1886-1887	1,047,000	34,600,000	35,647,000
1887-1888	1,031,000	34,912,000	35,943,000
1888-1889	1,040,000	40,706,000	41,746,000
1889-1890	1,100,000	41,500,000	42,600,000
1890-1891	1,150,000	43,000,000	44,150,000
1891-1892	1,275,000	45,760,000	47,025,000
1892-1893	1,400,000	48,500,000	49,900,000
1893-1894	1,425,000	47,350,000	48,675,000
1894-1895	1,750,000	54,225,000	58,975,000
1895-1896	5,475,000	54,450,000	59,925,000
1896-1897	8,500,000	60,683,000	69,183,000
1897-1898	9,925,000	67,525,000	77,450,000
1898-1899	10,114,000	65,310,000	75,422,000
Totals	$56,701,000	$902,338,000	$959,039,000

EXHIBIT OF COINAGE OF GOLD, SILVER AND COPPER IN THE REPUBLIC OF MEXICO, FROM THE 1ST OF JULY, 1873, TO THE 30TH OF JUNE, 1899.

YEARS.	GOLD DOLLARS.	SILVER DOLLARS	COPPER DOLLARS.
1873-1874	$866,743	$18,846,067	$15,966
1874-1875	862,619	19,386,958	21,712
1875-1876	809,401	19,454,054	30,654
1876-1877	695,750	21,415,128	9,035
1877-1878	691,998	22,084,203	41,364
1878-1879	658,206	22,162,987	16,300
1879-1880	5 1,826	24,018,528	14,035
1880-1881	492,068	24,617,395	42,258
1881-1882	452,590	25,146,260	11,972
1882-1883	407,600	24,083,921	.....
1883-1884	328,698	25,377,379	.....
1884-1885	423,250	25,840,728	.....
1885-1886	425,000	25,850,000	.....
1886-1887	410,000	25,800,000	.....
1887-1888	340,320	26,711,000	.....
1888-1889	305,100	25,274,500	.....
1889-1890	243,298	24,328,326	.....
1890-1891	308,000	24,238,000	.....
1891-1892	291,940	25,527,000	.....
1892-1893	361,672	27,169,876	.....
1893-1894	553,978	30,185,611	.....
1894-1895	545,237	27,628,981	.....
1895-1896	565,786	22,634,788	.....
1896-1897	453,474	19,296,009	.....
1897-1898	459,219	21,427,057	.....
1898-1899	715,882	20,184,117	.....
Totals	$13,189,655	$618,488,873	$203,296

SUMMARY.—Totals: Gold, $13,189,655; silver, $618,488,873; copper, $203,296; grand total, $631,881,824.

EXHIBIT OF THE COINAGE OF MEXICO FROM THE ESTABLISHMENT OF THE MINTS IN 1537 TO THE END OF THE FISCAL YEAR OF 1899.

COLONIAL EPOCH.	GOLD.	SILVER.	COPPER.	TOTAL.
Unmilled coin from 1537 to 1731	$ 8,497,850	$752,067,456	$200,000	$760,765,406
Pillar coin, 1732 to 1771	19,889,014	441,629,211	.....	461,518 225
Bust coin, 1772 to 1821	40,391,447	888,563,989	342,893	929,298,328
INDEPENDENCE.	$68,778,411	$2,082,260,656	$542,893	$2,151,581,960
Iturbide's imperial bust, from 1822 to 1823	$ 557,392	$ 18,575,569	.....	$ 19,132,961
Republic eagle, 1824 to June 30, 1873	45,040,628	740,246,485	$5,235,177	790,522,290
REPUBLIC.	$45,598,020	$758,822,054	$5,235,177	$809,655,251
Eagle coin, from July 1, 1873, to June 30, 1899	$13,189,655	$618,488,873	$203,296	$631,881,824

SUMMARY.—Colonial Epoch, from 1537 to 1821, $2,151,581,960; Independence, from 1822 to 1873, $809,655,251; Republic, from 1873 to 1899, $631,881,824; total, $3,593,119,035.

ARIZONA.

MARICOPA COUNTY.

Placer gold is reported discovered in the bed of the Arizona canal on the Indian reservation east of Phœnix.

YAVAPAI COUNTY.

J. C. Baumann of Prescott is developing copper claims at Swiss Girl camp with a diamond drill three miles from the Agua Fria river and fourteen miles in an air line from the United Verde.

Courier: The Octave M. Co., three-quarters of a mile from Weaver, is grading for a 40-stamp mill. Sinking on Genung's Leviathan group is in progress. A bucket tramway will be put in between the Johnson mine and the mill.

ALASKA.

The conditions between capital and labor at Cape Nome are peculiar. The beach diggers claim that the transportation companies which own the mines on the higher slopes are trying to get Congress to give them possession of the beach. The tide sands, up to 16 feet above high water mark, may not be taken up for ordinary mining claims. The United States authorities have been giving them out to all comers at the rate of 50 feet per man; this has made possible the statement that Nome is a "poor man's camp." This condition of affairs has resulted in a great scarcity of labor. No one wants to go to work by the day as a hired miner when he can make more money cradling for himself on the beach. Consequently, the companies are said to be playing for the beach in order that the diggers may be thrown on the labor market.

CALIFORNIA.

ALAMEDA COUNTY.

A sampling plant at Oakland is talked of by the Puget Sound Reduction Co. of Everett, Wash.

CALAVERAS COUNTY.

At the Vorlander mine, at Middle Bar, a crosscut will be run from the 150-foot level to locate a place for a permanent working shaft. The quartz formation, composed of a series of veins, is about 200 feet in width, so this cut will be run in order to explore the different veins. The Prospect says when this is accomplished machinery will be installed and the company will prepare to go down 1000 feet.

EL DORADO COUNTY.

(Special Correspondence).—The Ribbon Rock and Superior (or old Tincup) mines have been bonded by E. A. Davis for Mr. Hayward, and twelve men are now employed. The past record of the old Tincup is first class as a bullion producer. The Minnehaha mine, near El Dorado, is now running a small mill, and the Supt. claims it is milling about $18 per ton in free gold. The Chapman & Parker mill, near Texas hill, is now nearly completed and will soon be in operation.

The Kohn & Kimball mill, south of Placerville, is running steadily and employing twenty-five men. The Poverty Point mill of fifteen stamps is running and the lessees claim to be doing well.

The Larkin mine is said to be looking well on the 600-foot level and the mill is running. Prof. Jacobs has superseded C. H. Dunton as Supt.

The Coalman mine, south of Mathenas creek, in clearing out the old works, exposed some fine ore, and the owners feel jubilant. The Selby mine has again closed down temporarily.

The big mill at the Blue Gouge will be ready for operations in about thirty days. The old Schnider mine, near Diamond Springs, is being operated by new owners, who claim 4 feet of $10 ore in the tunnel level and 400 feet of backs for stoping. A contract has been let to sink the shaft deeper on the Little Gem mine, at Volcano. Smart & Lane are operating the old Van mine, near Georgetown. The Vandelia mine, below Mud Springs, is cyaniding forty tons of ore per day and making a handsome profit. The Orofino mine, owned by Hayward & Lane, has been running thirty stamps satisfactorily.

Placerville, Jan. 11th, 1900.

HUMBOLDT COUNTY.

Supt. H. Lawrence of the Stone Lagoon M. Co. is prospecting the Lagoon bottom with a sand pump. The beach sand mines along the Lagoon are to be worked.

INYO COUNTY.

At Saline valley this week the Western Borax Co. is pushing work on its large new steam plant.

KERN COUNTY.

At a depth of 220 feet the Buckboard, near Randsburg, is working a 12-foot vein and shipping ore to Barstow.

Miner: The Slate Range Milling Co. are putting up a rotary mill near the new borax works at Borax lake, with a capacity of twenty-five tons a day. The mill is almost completed.

Land values are appreciating near Bakersfield because of oil strikes. It is only four months since the first standard rig was placed in operation in the field and now there are 100 at work day and night. The oil is found in a fine sand, through which it percolates and with which it has become so thoroughly mixed that the mixture will flow slowly. This sand is from 200 to 600 feet deep. The S. P. has surveyed a route for a branch line to run into Discovery to haul the products of this section. Some of the oil will go 70% lubricating, but its principal value is for fuel purposes, and its development means the partial solution of the fuel problem on this coast.

MADERA COUNTY.

The Coarse Gold Gulch M. Co. has organized at Coarse Gold. Capital stock, $100,000; subscribed, $500.

MARIPOSA COUNTY.

Coulterville reports the Mary Harrison mine temporarily closed down, except sinking in the main shaft.

The News Bureau hears that the Merced gold mine is earning above all construction $1.25 to $1.50 per share per annum. The annual stockholders' meeting of the company will be held at Butte, Mont., on the 24th inst.

NAPA COUNTY.

The following number of flasks of quicksilver were shipped from the mines in this county during December just closed: Ætna 305, Napa 450, Great Western 100, Mirabel 20, Vallejo 69, Sulphur Bank 37, H. B. Lawley 1; total 982, or a decrease of 253 flasks from the November shipment, which was unusually large.

Four California quicksilver mining companies in this county paid quarterly dividends this week as follows: Ætna, 10 cents, and 5 cents extra; Napa Con., 10 cents, and 10 cents extra; Boston, 10 cents; New Idria, 10 cents, and 10 cents extra.

NEVADA COUNTY.

The construction of a dam on the Truckee river for the General Electric Co. has begun a mile from Floriston, 200 feet long, 10 feet high.

Supt. Turner is about to resume development work at the Coe mine, near Grass Valley.

Union: In the new shaft at the La Suerte mine there is a 20-inch ledge at a depth of 100 feet. The incline will be continued to the 300-foot level before drifting begins. The ore is expected to mill at least $10 per ton.——The Excelsior Water Co. is having the wing dam on Deer creek rebuilt.

PLACER COUNTY.

At Gold Run the South Yuba ditch is running water to its fullest capacity and the Gold Run Gravels Co.'s ditch is full. The company is running two hydraulic pipes.

The Herald reports that J. E. Spencer, who has bonded the Crandall quartz mine for $30,000, will sink 500 feet.

The late heavy storm has put water in all the mountain ravines, and will furnish a good head for ground sluicing.

Peter Oest is developing a copper vein near Bear river. A ton of unassorted ore is reported to have yielded $40.

PLUMAS COUNTY.

R. R. Gumbert of the West Elizabeth M. Co. is at Johnsville, where a tunnel has been run 1535 feet and auriferous gravel has been tapped.

At La Porte the Claybank is in operation. The Yankee Hill mine is ready for work.

SAN BENITO COUNTY.

The Victor Gold, Copper and Cinnabar M. Co. has organized at Hollister. Capital stock, $125,000; subscribed, $75,000.

SAN BERNARDINO COUNTY.

A 40-stamp mill is to be built at the

group of gold mining claims at Gold Hill, recently bought by J. De Lamar.

SAN DIEGO COUNTY.

Mica has been discovered by W. E. Cook and W. Brenfleck near Mountain spring, five miles east of Jacumba, near the Colorado desert. Four claims have been staked. The ledge is about 30 feet wide.

SHASTA COUNTY.

At Bully Hill a large body of high grade ore has been found in the lower tunnel. The company is running a third tunnel to tap the ore body 200 feet deeper than the Salee lowest tunnel.

The Mammoth group of copper claims are reported bonded to-day to Nova Scotian and English investors for $103,000. Three thousand dollars is paid, $50,000 to be paid Feb. 10th, and $50,000 April 1st.

SISKIYOU COUNTY.

The Schroeder mine is being worked by fifteen men.

The high or dry gulch diggings are well supplied with water.

Dr. G. W. Dwinnell, of Montague, has located nine quartz claims in Gazelle district, under the requirements of the State and Federal laws, with a view towards procuring patents for the same. He has made the preliminary location under the State law supposed to be invalid, but not so decided yet by the Supreme Court, and will then file final notice after sixty days' time, and $50 worth of work. The claims have also been located under the U. S. laws, with the required Federal yearly assessment work. By this action the doubt about the validity of the State law will be overcome. If the State law is good, his locations will be all right, and if not, no harm will accrue to issuance of patents under the Federal laws.

The Journal learns that fifteen new quartz mills are to be shipped into Siskiyou county next spring and summer, and that this winter so far is one of the best ever known in Siskiyou county for successful mining.

The upper works of the dredger on Yreka creek, near Hawkinsville, are being constructed.

The Superior Court has rendered a judgment in favor of plaintiff for the sum of $25,000, in the case of W. C. Stanley vs. The Ock Co., the Wing Ching Leng Co. and the Lee Jack Co., on a written agreement for the promotion of a sale of certain mining property at Happy Camp, bonded for $75,000. The agreement was that Stanley should get $25,000, and Ock $50,000, but Ock acting independently at a later period, sold the property for $50,000. The property was disposed of on the report and maps made by Stanley. Defendant's counsel contended that Stanley had abandoned the undertaking before he found a purchaser, and was therefore not entitled to commission on a subsequent sale, and the defendant sought other assistance to effect a sale. The Court decided that Stanley continued his efforts under the agreement, and that it was an independent transaction, regardless of the claim that the sale was effected after the expiration of the bond, no time having been stipulated for making the sale.

TRINITY COUNTY.

At the Brown Bear mine at Deadwood the main tunnel is in over 2500 feet. The ledge is supposed to be about 1500 feet farther. The tunnel is driven about 7 feet a day and is expected to strike the ledge 340 feet below the lowest level of the mine, a total depth of over 800 feet. Should the tunnel strike the ledge and find pay rock the works will be moved to the mouth of Thorn gulch and the company will build a 20-stamp mill.

TUOLUMNE COUNTY.

The shaft at the Pauper's Dream is 290 feet deep and sinking continues.

Democrat: At the Mt. Jefferson preparations are being made to start the three compartment vertical shaft on hanging wall. This will be driven down 1000 feet, though it is expected to strike the vein at a depth of 500 feet. Supt. M. Meighan says he will have the new 10-stamp mill in operation by the 15th inst.

COLORADO.

In their annual summing up, the Denver Times puts the gold output of Colorado for 1899 at $35,081,516, silver $14,650,274; the Republican puts it at $33,000,000 gold, $15,500,000 silver; the News at $31,329,056 gold and $12,680,256 silver.

BOULDER COUNTY.

The values of the various minerals mined during the past year are as follows:

Gold	$523,170
Silver	47,934
Lead	500
Copper	2,537
Total	$574,141

CHAFFEE COUNTY.

At Granite placer miners have built a ditch nine miles long, costing over $100,000. The mine yields from $150,000 to $200,000 each season from April to November, and employs about 250 men.

At Winfield a smelter is completed.

The Gladstone mine, idle since '93, is now being worked.

The amount of ore shipped from all the different mines of the county is figured at 500,000 tons.

CLEAR CREEK COUNTY.

(Special Correspondence). — Contracts have been let to push work on the Pennsylvania tunnel. It starts in the mountain between north and south forks of Clear creek and will run toward Bald mountain. The work has progressed well and several lodes are said to have been cut.

The Fairmount, in Hukill gulch, worked steadily for a while, but it is now closed under a court injunction. Numerous mill runs made show values ranging from $21 to $125 per ton.

The Sun & Moon, on Seaton mountain, is now in charge of H. N. Sims. The Mynott shaft on this group, now 400 feet deep, is sinking to greater depth. Two other shafts were made on the group in former years.

The Anderson mill of ten stamps and two grinders is running steadily and averages about thirty tons per day. Values are saved on the plates and in concentrates. G. Carlson is in charge.

The Jackson mill, managed by J. G. Roberts, milled 13,000 tons of ore in 1899, reducing same to 2600 tons of concentrates. No amalgamating is done here, being purely a concentrator, and runs entirely as a custon mill.

The Shafter group, on Bellevue mountain, is shipping about 300 tons per month, all of which is milled. The main shaft is 700 feet deep, from which various levels reach the ore body. The work approximates 3000 feet. It is owned by a New York company, whose Mgr. is J. H. Shepherd.

Dr. Frank G. Carpenter, connected with mines and smelters of the Black Hills, S. D., has been investigating various properties in this county and may become interested.

The Freeland Extension, bought last year by Massachusetts parties, is being developed and equipped under the management of J. H. Le Moyne. Incidental to development work, about 100 tons of ore per month are being milled. The work is carried on through the old Freeland level. A new shaft is being sunk to tap the main level. Two carloads of machinery were recently shipped to the property. The ores carry gold, silver and copper.

A bond and lease on the Mayflower for three years has been acquired by J. H. Le Moyne. WASCOTT.

Idaho Springs, Jan. 3, 1900.

The county is credited with producing in 1899:

Gold	$666,080
Silver	959,636
Lead	254,468
Copper	43,117
Zinc	25,000
Total	$1,948,301

HINSDALE COUNTY.

The production of the county for '99 of all ores in tons was 7280, of a value of $728,000.

An enterprise during the past year has been the erection of the Golden Fleece mill. The Golden Fleece has paid a monthly dividend of $18,000 for over two years. The Golden Fleece people are running a long tunnel to cut their ore bodies; and when connections with the old workings are made, the Golden Fleece ore will only have to be hauled half a mile. At present the company is leasing a good portion of their ground, and each leaser is averaging from $150 to $200 per month.

LAKE COUNTY.

During '99 the county produced:

Gold	$2,257,018
Silver	4,200,000
Lead	1,554,494
Copper	967,666
Manganiferous iron and zinc	500,000
Total	$9,479,178

PITKIN COUNTY.

The Denver News credits Pitkin county with a gold production of $67,419 during '99. Other values were: Silver, $2,200,922; copper, $700; lead, $605,957. Total mineral output, $2,874,998. The tonnage to produce these values, excepting the gold, is given as 185,000. The figures were obtained from smelters and reduction works.

PUEBLO COUNTY.

The output of Pueblo's three smelters for '99 was as follows:

Gold, oz	405,907	$ 8,390,097 69
Silver, oz	13,713,859	8,174,831 35
Copper, lbs	7,356,613	1,239,589 29
Lead, lbs	115,698,735	4,935,708 08
Total		$22,740,226 37

SAN JUAN COUNTY.

The mineral production of San Juan county for 1899 was:

Gold	$1,500,000
Silver	710,591
Lead	657,000
Copper	170,000
Total	$3,037,571

SAN MIGUEL COUNTY.

The cyanide plant of the St. Louis Gold Recovery Co., at Gold Run placers, has begun the treatment of 100 tons tailings daily.

The estimates for the Tomboy and Smuggler-Union place the '99 output for each of these properties at between $600,000 and $700,000 respectively.

SUMMIT COUNTY.

Summit county's production for last year is given at:

Gold	$430,000
Silver	266,350
Lead	212,972
Copper	2,224
Total	$911,546

TELLER COUNTY.

According to the Post, the Isabella, at Cripple Creek, will make no more extraordinary shipments of high-grade ore, but will take the average as it runs in the vein and let it go at that. They have experienced some trouble in settling with the smelters on their very rich consignments, and also with the railroads, which object to hauling ore worth $8000 per ton at the same rate charged for carloads of medium grade. It is said that in the tenth level the miners are now breaking 5 feet of stuff that will average, without sorting, from thirty to fifty ounces gold per ton.

IDAHO.

There have been a number of inquiries made of the Attorney-General as to the fee for recording affidavits of annual work on mining claims when an affidavit covers more than one claim. Some of the recorders have been demanding 50 cents for each claim. The Attorney-General, in response to an inquiry from the Recorder of Elmore county, says: "Replying to your question as to what the legal fee is for recording affidavits of annual labor, I will say that the statute seems to provide that the fee shall be 50 cents and no more. There is no reason why the affidavit may not cover more than one claim, and I find no authority in such case for a greater charge than 50 cents."

The Helena-Frisco Co. of Montana has sold the Helena-Frisco mine on Canyon creek to the Frisco Con. M. Co., Ltd., organized under the laws of New Jersey, capital stock $2,500,000. The action of the Helena-Frisco stockholders completes the consolidation of the Helena-Frisco, the Black Bear, Gem and Galena mines, and makes the biggest mining corporation in the Cœur d'Alenes. Joseph McDonald, Mgr. Helena-Frisco, will be Mgr. of the consolidated company. The Helena-Frisco represents a little more than one-half of the new company. About $1,200,000 will be paid for the Black Bear, on which $200,000 has just been paid, and the Galena and Gem.

BLAINE COUNTY.

Hailey Times: J. R. Blackhart has leased to the Cœsus M. Co. for five years, with the privilege of ten, 30 inches of the waters of a spring on his ranch for $25 cash in hand and $150 a year, payable "the 11th day of each year."

OWYHEE COUNTY.

In Aug., '99, Mgrs. Huntley of the De Lamar and Hutchinson of the Florida Mountain, made a wager as to which set of men would make the greater progress during the remainder of the year, the two tunnels on Sept. 1st being each in about the same distance, 250 feet. Mgr. Huntley's men won. Work was prosecuted from Sept. 1st to Dec. 31st. Total time of operation 120 days. Monthly progress was as follows: Sept., 279 feet; Oct., 389 feet, and 6 feet for a powder thawing crosscut; Nov., 402 feet; Dec., 436 feet. Total, 1512 feet. Average progress per 24 hours for four months, 12.6 feet; average progress per 24 hours for Oct., Nov. and Dec., 13.54 feet; average daily progress for Nov. and Dec., 13.96 feet; average daily progress for Dec., 14.5 feet. The size of the tunnel is 7½x7 feet wide. The formation is a black basalt, at times for over a week having bands of very hard, short, tough, seamy ground, standing on edge. The best three weeks records are 107, 110½ and 120½ feet; the poorest 25, 60 and 78 feet. The tunnel is comparatively dry, only a few water seams being encountered. No timbering of consequence was required. The tunnel is ventilated by an exhaust fan and a 12-inch air pipe. A candle can be seen for its whole length. The track is of 12-pound T rail, with 4x4 stringers. A 2-foot wide plank walkway is placed beside the track and over a ditch, which is 18 inches wide and 12 inches deep. The total cost of the tunnel for these four months, including labor, track, pipe, tools, blacksmith's coal, fuel for compressor, lights, explosives, timber, oil, etc., has averaged $12.41 per foot, which is not excessive in that district and present high prices. Two machine drills were used. Labor was in eight-hour shifts, except during the last six weeks, when drillmen worked six-hour shifts only. Mules were used after 500 feet to haul six to ten cars to the surface. The entire work was under the supervision of Thomas Davey, foreman of the De Lamar mine, and the De Lamar Nugget, from which the above is condensed, says to him is largely due the credit for the rapid progress.

During 1899, at the United States Assay Office in Boise, the deposits amounted to $1,813,988.61, an increase of $436,399.79, or 31.6% over 1898.

MICHIGAN.

The production of refined copper by the lake mines in 1898 was 157,835,729 pounds; an estimate of last year's production is 157,500,000 pounds.

MONTANA.

SILVER BOW COUNTY.

The bill of costs in the suit of the Montana Ore Purchasing Co. against the Boston & Montana Co. over the veins of the Pennsylvania mine has been submitted to the court by the plaintiff. The Inter-Mountain says it is the largest ever presented in a Montana suit, aggregating $324,134.68. Of the total $258,373.01 is placed to the credit of development work. The amount paid the attorneys does not come under the heading of legal expense, and therefore no reference is made to it in the document. The various items of expense are as follows:

Deeds	$46 70
Witness fees	1,641 00
Surveying	3,500 00
Development work	258,373 01
Preparation of maps	5,184 57
Models	3,494 41
Stenographic work	1,050 80
Assaying	1,516 00

The expert work necessitates an outlay of $21,891.64, divided as follows:

O. A. Palmer	$3,496 50
J. W. Neill	1,925 18
F. L. Sizer	1,740 00
A. H. Brown	276 50
W. S. Kelley	2,654 30
G. W. Towne, Jr	436 66
James Macfarlane	1,800 00
C. H. Robinson	7,650 00
J. H. Trerise	1,912 50
Total	$21,891 64

The document further shows that over five miles of development work was done in the property by the plaintiff, while preparing for the trial. It is divided as follows: Open cuts, 885 feet; tunnels driven, 775 feet; shafts sunk, 393½ feet; winzes sunk, 307 feet; raises driven, 6312½ feet; drifts and crosscuts driven, 20,133 feet; making a total of 28,806 feet at a cost of $8.95 per foot.

The laws of Montana now provide that persons filing water rights must state the amount of water they claim in cubic feet per second. The old law recognized the time-honored Western measurement in miner's inches, each being the amount of water which would flow through a hole 1 inch square under a head of 6 inches. With slight variations, this rule held good from the Missouri to the Golden Gate. One cubic foot per second equals 40 miner's inches.

NEVADA.

ELKO COUNTY.

At Elko last week the property of the Gold Creek M. Co. was sold to satisfy a judgment in the sum of $17,061.35. It was bid in for the amount of the claim.

WASHOE COUNTY.

Tests are being made at the Reno Reduction Works of the Jackson & Libby new method of working copper ores by electrolysis.

NEW MEXICO.

The Territory figures for '99 a yield of $1,800,000 gold. The value of copper was about the same as gold, one-third of it being treated in El Paso and Pueblo, and the rest at Silver City. Santa Rita and Hanover were the largest producers. The copper carries gold, but in this estimate the values are separated, the copper value alone being about $1,800,000. Iron ore valued at $75,000 to $100,000 has been shipped to Pueblo.

The only lead properties shipping largely are at Cook's, near Deming. The mines have in some years shipped $250,000 and probably reached $200,000 this year. Large bodies of zinc in Grant county have been worked slightly. Silver to the extent of $650,000 has been mined in straight and mixed ores.

The coal mines at Gallup have doubled

their output. The mines of the new White Oaks region ship a trainload of coal daily. The mines of the Colorado Fuel & Iron Co. at Cerillos and elsewhere are not increasing in production.

SIERRA COUNTY.

The Hillsboro mines during 1899 produced 6,156 tons of ore. Of this, 5,325 tons of milling ore showed an average value of $19.43 per ton, and 831 tons shipped to the smelters was worth $83 per ton. The placers yielded $8000, making a total production of gold of $181,500. For every $5 of gold there were also $1 in copper and silver.

OREGON.

BAKER COUNTY.

The Baisley-Elkhorn mine shaft is to be sunk deeper and an electrical installation is contemplated. The December output of the Bonanza mine was over $100,000.

Arrangements for deep mining at the Red Boy, in Sumpter district are perfected. The owners, who so far have been taking out ore by tunnel, will now sink a deep shaft.

JACKSON COUNTY.

H. E. Ankeney, of the Sterling mine, is operating his hydraulics night and day under a full head of water and expects to sweep a large area of bedrock. He has twenty-six men at work.

SOUTH DAKOTA.

State Mine Inspector Cusick estimates the State output of '99 as follows:

Homestake M. Co	$2,674,336
Highland M. Co	936,000
Horseshoe Co	562,100
Holy Terror	900,000
Hidden Fortune	200,000
Golden Reward (chlorination)	648,000
Blacktail mines	60,000
Golden Reward Smelter	2,300,000
Rapid City (chlorination)	24,000
Allen, Small & Asso (cyanide plant)	19,000
Spearfish cyanide plant	63,000
J. R. stamp mill	6,000
Central City cyanide plant	8,000
Cochran quartz mill	9,000
Placer mines	12,000
Other mines and mills	10,000
Ore shipped out of Black Hills	700,000
Total	$9,131,436

UTAH.

JUAB COUNTY.

During 1899 there was produced from the mines of the Centennial-Eureka Co. 58,250 pounds of lead, 666,547 pounds of copper, 238,981 ounces of silver and 13,-702$\frac{200}{1000}$ ounces of gold. This property paid its owners 142 dividends of 50 cents each, a total of $2,100,000, the amount which was received by them for the property from its present owners.

The Bullion-Beck & Champion operated its concentrating mill four months during 1899. It has a capacity of 200 tons of ore per day. During the year it shipped: Concentrates, 1954 tons; ore, 14,545 tons; total, 16,499 tons. It also paid $100,000 in dividends, bringing the total in dividends to the company up to $2,557,000. No surface improvements were made.

WYOMING.

During the year 1899 Wyoming's mineral output amounted to $6,091,763.85, divided as follows:

Coal	$4,659,156 25
Gold	1,003,191 00
Copper	275,960 50
Iron	114,500 00
Silver	39,456 10

FOREIGN.

AUSTRALIA.

A Melbourne dispatch says the gold yield of that colony in 1899 was 854,500 ounces, an increase of 17,242 ounces.

BRITISH COLUMBIA.

The Minister of Mines has issued a notice terminating the tenure of office of all gold commissioners and mining recorders for the districts the boundaries of which have been changed, and reappointing them to the newly described districts. Transcripts must be made of all records of claims affected by the boundaries, even in cases where claims have become vacant or have been abandoned.

LOWER CALIFORNIA.

The Boleo Copper Co., at Santa Rosalia, is credited with having bought 12,000 tons of coke to be shipped to Guaymas by rail and across the gulf to its destination.

MEXICO.

In the Santa Barbara mining district, near Parral, the Guggenheim Bros. and the Kansas City Smelting & Refining Co. have recently invested $4,000,000 in mining. The Guggenheims have bought the Tecolotes mine from the Etquicia M. Co. for the round sum of $700,000. The Kansas City company has bought more than 100 claims, among them the Alfareria mine, for $125,000 in gold, the Santa Gertrudis for $70,000, the Rosario for $60,000, the Remedious for $10,000, all these in Mexican currency, and the Mina Del Auga. The Kansas City company, through its representative, H. L. Bridgeman, has secured a concession for a section six miles square, for which it paid the Government $50,000. All these purchases have been made for cash paid on delivery of the title deed. The mines on the average produce low-grade ore. None are more than 150 feet deep. The Mexican Central has surveyed an extension of its line from Parral to several miles south of Santa Barbara.

SOUTH AFRICA.

The DeBeers Mining Co. announces that it has a message from the board of directors at Kimberley instructing the London office not to pay the semi-annual dividend now due, as the company must husband its resources, and it is uncertain whether it will be able to resume work in the mines.

THE KLONDIKE.

Engineer J. C. Tache, at the Five Fingers, will blow up those dangerous rocks as soon as the river is well frozen around them, and will also clear the Rink rapids. This will almost make navigation in the Upper Yukon or Lewes river safe. The Yukon begins at Fort Selkirk where the Pelly joins the Lewes. The creeks leading into the Stewart river are said to be showing up well. The Stewart runs into the Yukon, seventy-five miles this side of Dawson, where there is plenty of timber and an ample supply of water, just what a miner most desires with a thawing machine.

From the number of free miners' licenses issued at Dawson during '99 indicates there are 10,000 men mining in that district. From Nov. 1, 1898, to Nov. 1, 1899, were issued 10,018. During those twelve months there were issued 11,349 placer mining grants, 4,967 for original locations, 5,161 renewal of extent grants and 1,221 for relocations. There was filed a total of 1,705 relocation applications, about 30% of which were refused because of insufficient proof as to the validity of alleged claims of forfeiture.

The total number of quartz claims which had been granted in the Dawson district up to and including Nov. 7, 1899, is 525. These grants are for 1500x1500 feet each. To date annual assessment work had been performed only on seventy-nine of these claims, while applications for final crown grant has been made for only four. As to hydraulic concessions there have been filed about 245 applications, covering nearly 830 miles.

Commercial Paragraphs.

THE San Francisco agency of Schaw, Ingram, Batcher & Co. is now at 539 Mission St.

J. D. HEINZMAN has become a partner of A. M. Donaldson, Denver, Colo., buyer of bullion, wastes, ores and metals.

THE Hercules Gas Engine Works, of San Francisco, will in future be found at their new and handsome headquarters, 141 and 143 First St., where Manager Poindexter will have on display and in running operation different sizes of their manufacture.

JOHN A. ROEBLING'S SON'S COMPANY, 117-119 Liberty street, New York City, and Trenton, N. J., has the contract for the steel cables, bands, suspenders, coverings, sheaves and their appurtenances for the new East River bridge at New York City. This company was the only bidder. The contract price is $1,398,000. There will be 4000 tons of material required in the work.

WM. AINSWORTH & SONS, manufacturers of assay balances and scientific instruments, Denver, Colo., are constantly increasing their facilities for work, now having a force of twenty men. A new feature in their assembling department is an iron frame, 20 feet long, sustaining 40 feet of bench room for all kinds of fine lathe work; and upright arms holding line shaft and counter shaft, thus doing away with ceiling hangers. Messrs. Ainsworth have established an agency and put in a stock in the City of Mexico.

Calendars.

Literally a "flood" of calendars sweep in for 1900. Bright and brilliant is that sent by the Wm. Powell Co. of Cincinnati, Ohio, whose regrinding star-valve is becoming so well known. The handsomely bound catalogne supplied by the Joshua Hendy Machine Works, San Francisco, is also a thing of beauty and a joy for 365 days, and the Gates Iron Works, Chicago, Ill., furnishes a fine celluloid one that is good for the first half of the twentieth century.

Personal.

GEO. JACOBS succeeds C. H. Dunton as Supt. Larkin mine, Placerville, Cal.

ROBT. E. TALLY, assayer at the Reno. Nevada reduction works, has resigned his position.

D. H. JACKSON, of El Dorado county, Cal., has returned from San Francisco to Placerville.

C. M. DOBURY is in San Francisco to organize the Tuolumne, Cal., Power & Electric Co.

JUAN F. TREVINO has been appointed general manager Chihuahua (Mexico) Mineral Railway.

CHAS. DOBLER, Supt. Brown Bear mine, Deadwood, Trinity county, Cal., is in San Francisco.

T. W. PAYNE, Gen. Mgr. Grand Reef mine, has returned from New York to Wilcox, Arizona.

J. R. DILLON, president Jerome, Arizona, Copper Co., is examining mining property in Mexico.

W. H. THOMAS, former manager Niagara M. Co., Bingham, Utah, is at the smelter, Madera, Cal.

OSCAR SZONTAGH has taken charge of the metallurgical work at the Bully Hill mine, Shasta county, Cal.

FRANCIS JANNEY succeeds D. C. Jackling in the superintendency of the Golden Gate, Mercur, Utah, mill.

JOS. S. WOODRUFF is traversing Oregon and Washington, collecting mineral specimens for the Paris Exposition.

A. F. HOLDEN, president Centennial-Eureka M. Co., Utah, has gone to Costa Rica to inspect mining property there.

A. J. BAYS, of Juneau, has been appointed deputy U. S. Marshall at Cape Nome. He will go in this winter over the ice.

CHAS. R. WARDLE of New York is in San Francisco, en route home from examination of mining property in northern California.

WARNER MILLER, of New York, is reported to be at the head of a movement for a new railroad from Salt Lake City to San Francisco.

LOUIS GLASS, of San Francisco, has returned from a visit to the Cherokee mine, Butte county, Cal., of which he was formerly superintendent.

MAJOR W. H. HEUER, U. S. Engineer Corps, and member of California Debris Commission, at San Francisco, is promoted to be Lieutenant-Colonel.

LEO VON ROSENBERG has returned to New York City from California, after examining mining properties in California, Arizona and New Mexico.

JAS. BEVERIDGE, recent Supt. New Mammoth, Utah, M. Co., goes to Ecuador, S. A., to manage the mining property of the American Development Co.

W. A. HEWITT, of the Compressed Air Machinery Co., 11-13 First St., San Francisco, has returned from an extended business sojourn on the Atlantic coast.

JAS. R. KEENE, who once ran a milk wagon in Yreka, Cal., is credited with "cleaning up" $3,000,000 in stock deals in New York City in the past sixty days.

A. L. WATERS, formerly with the United Globe, Arizona, smelter, is now Supt. Val Verde smelter, on the Agua Fria, twenty miles from Prescott, Arizona.

WILLIAM H. NUTTING, of Colorado, will superintend the construction of the pyritic smelter, with which the ores of the Bingham C. & G. M. Co., at Bingham, Utah, are to be reduced.

W. E. COOKE, representing the Kalgoorlie Electric Power & Lighting Corporation of London, and Kalgoorlie, Australia, is inspecting the mines and power plants of Cripple Creek, Colo., district.

W. M. THORNTON is in San Francisco, en route to Anaconda, Montana, from the Philippines, whose mineral resources he thinks will be worth developing by American miners after peace has been restored.

FRED NOWELL, of the American G. M. Co., at Skaguay, Alaska, from a trip to Berner's Bay, says that on the Kensington mine of the Northern Bell G. M. Co., development work progresses. Work at the Comet is showing good quality of ore, and thirty stamps will be operated through the winter.

W. C. GREENE, Pres. Greene Con. M. Co., Arizona, is in San Francisco on his way to New York. He says 300 men are at work in the Cananeas at the mines and at the smelter of his company. Six carloads of copper matte are monthly shipped via Naco, a 45-mile haul. Geo. Mitchell, formerly of the United Verde, is in charge. Naco, Ariz., is his address.

WILLIAM H. BAKER, vice-president and general manager of the Postal Telegraph Co., says: "The telephone and telegraph companies, with the electric light and trolley car concerns, consume a large part of the copper produced. But we cannot pay the present exorbitant price. Our company has reached the conclusion that aluminum wire is preferable. The wire must be twice as large to obtain the same conductivity, but in spite of its increased size it is much lighter than copper, and already cheaper. If the present price of copper holds aluminum will be generally adopted by all concerns which require wire to transmit electricity."

GOVERNOR THOMAS has appointed the following delegates to represent Colorado at the National Mining Congress to be held in Milwaukee next June: H. A. Lee, W. S. Stratton, Alva Adams, W. F. Buckley, James Doyle, John R. McKinney, Frank M. Woods, J. F. Burns, W. S. Montgomery, Clark W. Roe, Victor G. Hills, C. J. Moore, A. V. Bohm, C. T. Carnahan, Henry I. Higgins, S. J. Sullivan, Francis Carney, T. S. Walsh, F. H. Cane, George S. Newman, S. I. Hallack, Frank E. Wheeler. D. A. Tarrell, E. J. Elliot, James H. Robin, E. G. Stoiber, W. Z. Kinney, S. V. Newell, W. H. Graves, Charles Painter, Mead Hammond, J. A. Minor.

Industrial Notes.

—Iron and steel of the value of $7,600,000 were produced in Colorado last year.

—The Santa Fe and the Southern Pacific Companies have perfected an agreement dividing California business.

—The Wilmerding School of Industrial Arts began its existence in San Francisco on the 8th inst., with eighty pupils.

—The Southern Pacific Co. will lay double tracks on every line radiating from San Francisco for a distance of 100 miles.

—The Telluride Electric Power Co., Colorado, has ordered increased amounts of aluminum wire for conveying current.

—The O. R. &. N. Company and the Oregon Short Line have contracted for a $300,000 new equipment, to give double service between Portland and Granger.

—A. Bodyuuski, V. Patapoff and F. Brevisoff, of Russia, are in San Francisco as commissioners from Russian colonists to report upon the Pacific point best suited for a colony.

—"To raise and maintain prices" the shingle mills of Whatcom county, Wash., were closed last November. The secretary writes that that object has been attained, and the mills will resume.

—The torpedo boat destroyer Goldsborough, which the Wolff & Zwicker Iron Works of Portland have completed, was given her trial on the Columbia this week and attained a rated speed of 32½ miles per hour.

—The French embassy in Washington informs the State Department that the Government at Paris has consented to suspend the customs duties on advertising matter from the United States intended for circulation at the Exposition.

—Regarding that California eight-hour law, the State's Attorney-General has decided that "a watchman or special policeman who performs no labor is not a laborer within the meaning of the statute, nor is he either a workman or a mechanic."

—The contract for construction of twenty-three miles of the Colorado Springs & Cripple Creek Railroad is let. The brokers of the Colorado Springs Mining Stock Exchange have subscribed the bonds. The entire sale of bonds amounts to $1,200,000.

—The United States will have a more extensive exhibit at the Paris Exposition than any other country with the exception of France, which will utilize one-half the total space. The American exhibit will be several times larger than Great Britain's, and as large as Russia's and Germany's combined.

—Two large corporations have been formed in New Haven, Conn. One, the Ontario, Lake Superior Company, with a capital of $20,000,000, will operate timber lands and engage in transportation business in conjunction with the Canadian Pacific. The other, the War Eagle Consolidated Mining Co., with a capital of $15,000,000, will develop mines near Boise City, Idaho.

—The Dawson telegraph line paid an aggregate of $13,000 for October and November in tolls. One day in December $400 was taken in at Skaguay. Messages of a commercial nature come and go between the United States and British Columbian points, Germany, France, England, Belgium and New Zealand. Messages received at Skaguay are dispatched by the first steamer leaving under American or other flag for the south, and are telegraphed to destination from the first point touched by the ship having connection with wire with the outside world.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING JAN. 2, 1900.

640,264.—SKATE—S. S. Black, Pasadena, Cal.

640,445.—METAL PARTITIONS FOR BUILDINGS—C. Collins, S. F.

640,178.—SPRING HINGE—J. W. Currier, Los Angeles, Cal.

640,277.—TROUSERS' PROTECTOR—P. E. Daniels, Oakland, Cal.

640,637.—HASP FASTENER—J. Davey, Oakland, Cal.

640,642.—HAT FASTENER—A. B. Enns, Dallas, Or.

640,372.—HEADER AND THRASHER—J. G. Evans, Waitsburg, Wash.

640,463.—HYDRAULIC ELEVATOR—P. J. Gildea, S. F.

640,378.—OIL BURNER—C. A. Hammel, Los Angeles, Cal.

640,285.—RAILWAY TIE—W. M. & E. G. Hodson, Roseburg, Or.

640,569.—NUT LOCK—J. Jorgensen, S. F.

640,304.—CLAMP—E. L. Lowe, S. F.

640,578.—TEMPORARY BINDER—E. Marsky, San Jose, Cal.

640,477.—STREET SWEEPER—J. Maxon, Burbank, Cal.

640,411—PLOW—W. H. Parlin, Seattle, Wash.

640,695—CARBURETOR—E. D. Parrott, Portland, Or.

640,487.—BICYCLE SUPPORT—V. A. Pernot, Colegrove, Cal.

640,488.—MUST PUMP—J. A. Philpott, Windsor, Cal.

640,496.—CARTRIDGE LOADER—G. E. Standish, Selby, Cal.

640,714—LOOM—Simpson & Northrop, Tustin, Cal.

640,117.—EXTRACTING PRECIOUS METALS—Tatro & Sharpe, Seattle, Wash.

640,718.—EXTRACTING PRECIOUS METALS—Tatro & Sharpe, Seattle, Wash.

640,242.—STEAM STEERING GEAR—Turner & Miller, Seattle, Wash.

640,341.—ROCK DRILL—G. D. Whitcomb, Glendora, Cal.

640,248.—PAPER FOLDER—F. Wulff, Colusa, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

METAL PARTITION AND FURRING FOR BUILDINGS.—C. Collins, San Francisco, Cal. No. 640,445. Dated January 2, 1900. The object of this invention is to construct a light and rigid metallic frame work which will serve for partitions, furring, ceilings and other subdivided structures. It consists of strips or sheets of metal which are slotted or cut so as to provide strips which remain connected at one end with the main portion, and are bent outwardly therefrom and extend across at any desired angle, and either flat or twisted so as to form connections and braces between adjacent main strips.

NUT LOCK.—J. Jorgenson, San Francisco, Cal. No. 640,569. Dated Jan. 2, 1900. The object of this invention is to provide a locking device for nuts which are used upon vehicle axles, shafts or bolts, and under such conditions that the nuts fit upon the end of the shaft or bolt where it is necessary to prevent their turning off or becoming loosened, while at the same time they may be easily disengaged when it is desired to loose the nut. The nut has a radial groove straight across its face from the central opening to one outer edge, a hole made at one side parallel with the central threaded opening. A spring-pressed stem is mounted in said opening, and an arm directly on the end of the stem extends at right angles thereto straight across the face of the nut, radial to the center of the opening and lying within the radial groove. This arm has a beveled point lying interior to the wall of the opening in the nut adapted to engage a notch in tha screw to lock the parts after the nut has been seated. The spring by which the arm is normally held in engagement with the nut will readily yield to allow the arm to be raised and thus disengage the locking device when it is desired to remove the nut.

MUST PUMP.—J. S. Philpott, Windsor, Cal., one-half interest assigned to Geo. A. Nalley, same place. No. 640,488. Dated Jan. 2, 1900. This invention relates to that class of pumps which are designed to remove the express juice of the grape called "must." It comprises open-topped cylinders with pistons movable therein, a crankshaft with connections between the pistons and the cranks, so that by turning the shaft the pistons are reciprocated. Ports are made through the pistons surrounding the center, and a spring-pressed valve is closable from below over the ports. A valve chamber is bolted to the bottom of the cylinder, having a passage between it and the lower part of the cylinder. A spring-pressed closable globular valve is fitted into the chamber and closes the passage on the upward movement of the piston, but opens when the piston is forced down to allow the escape of the liquid. The valve has a guide stem from below and a conical vertically perforated projection from the lower head of the valve chamber forms a guide within which the stem is slidable and the valve and spring maintained in position. Holes are made through the bottom of this guide hole for the escape of any liquid which may find its way therein.

HYDRAULIC ELEVATOR.—P. Gildea, San Francisco, Cal. No. 640,463. Dated Jan. 2, 1900. This invention relates to an apparatus which is designed for elevating sand and other material by the aid of jets of water introduced under pressure into the elevating pipe. It consists of concentric tubes, the inner of which conducts the material to be lifted and the outer of which receives water under pressure, which is delivered into an enlarged closed chamber at the lower end and surrounding the inlet of the inner chamber or tube. This inlet forms a suction pipe, and jet tubes or pipes passing through the bottom of the chamber discharge the water under pressure into the inner chamber, thus producing a vacuum which will draw the material through the suction pipe, and a velocity and momentum which will eject it through the discharge passage. These jet tubes are preferably spirally disposed around the inlet, and, by this construction, they produce a rotary or whirling action, which prevents the packing of the material and its lodgment within the apparatus.

COVER AND BINDER FOR PAPERS.—Emil Marsky, San Jose, Cal. No. 640,578. Dated Jan. 2, 1900. This invention relates to a cover and binder for magazines, pamphlets, loose sheets of any description and the like, which it is desired to hold temporarily and permanently between the covers. It consists of a rigid back having rigid flexibly connected edge sections and cover sections upon each edge. Rigid plates are fixed at each end of the back, with inwardly turned tongues adapted to engage slots in the papers to be held, and a spring or springs are fixed to one of the edge sections adapted to press upon the papers when said section is turned to enclose them. Clamps at opposite ends of the back have arms, one of which is pivoted to one of the edge sections and has an extension beyond its pivot point, and the other arm encloses the other edge section and is sufficiently shorter so that, when turned to allow the other parts to be opened, it releases the other large section, while the other arm extends across the other edge section and cover portion, which is flexibly connected therewith.

Recently Declared Mining Dividends.

Amazon, Colo., Co., 9 cents per share, $12,000; payable Jan. 15.

Consolidated Zinc & Lead Co., quarterly dividend, 2½% on preferred stock; payable Jan. 15.

Portland, Colo., Gold Mining Co., regular monthly dividend 2 cents per share, $60,000; payable Jan. 15.

Arizona-Eastern Montana Smelting Co., monthly 2%.

Cloverdale Zinc M. Co., quarterly 2%.

Vindicator Con. G. M. Co., Colorado, $53,250; payable Jan. 25.

Latest Market Reports.

SAN FRANCISCO, Jan. 11, 1900.

SILVER—Per oz., Troy: London, 27⅞d (standard ounce, 925 fine); New York, bar silver, 58⅞ cts. (1000 fine); San Francisco, 58⅞: Mexican dollars, 48c.

A Mexican dollar is worth 48 cents in American money; an American dollar is worth about $2.10 in Mexican money. The difference in exchange is made at the Laredo office.

COPPER.—New York, Lake, $16.50; electrolytic, $16.00; casting, $16.12½; St. Louis, $16@16.25; San Francisco, 17½@18. Mill Copper plates, 23¾c; bars, 25½@27c.

LEAD.—New York, $4.70; St. Louis, $4.75; San Francisco, $4.80; pipe 7½, sheet 8¾, bar 6½c. London, Soft Spanish Lead, £16 13s 6d=4.69c per lb. An interesting article on the change in the basis of lead quotations will be found on page 38.

SPELTER.—New York, $4.55; St. Louis, $4.50; San Francisco, ton lots, 5½c; 100-lb lots, 6½c.

ANTIMONY.—New York, 9½c; San Francisco, 1000-lb lots, 10c; 300 to 500 lbs., 11@14c; 100-lb lots, 15@18c.

BABBITT METAL.—San Francisco, No. 3, 6½@8c.

IRON.—Pittsburg, American soft, $25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c.

STEEL.—San Francisco, bar, 11½@20c per lb.

QUICKSILVER.—New York, $52.00; London, £9 13s; San Francisco, local, $51.50 ℔ flask of 76½ lbs.; export, $47.

PLATINUM.—San Francisco, crude, $14 ℔ oz.; manufactured, $19@22.

FERRO-MANGANESE.—San Francisco, ℔ ton, $30.

ZINC.—San Francisco, 53¼; slab, 6½c; bar, 8.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

TIN.—New York, pig, $26; San Francisco, $29; bar tin, ℔ lb, 35c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c.

NICKEL.—New York, 40@45c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.60; San Francisco, $2.

CANDLES.—Granite 6s, 16 oz. 9½c; 14 oz., 8½c; 12 oz., 7½c; 10 oz., 6½c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

COAL.—San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs' $10.05; Colorado Anthracite, $14.50.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 34@36c ℔ lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, 1¾c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2¾c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, strictly pure, boiled, bbl., 66c; cs., 71c; raw, bbl., 64c; cs., 69c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 61c; cs., 66c; raw, bbl., 59c; cs., 64c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 20c; Astral, 20c; Star, 20c; Eocene, 22c; Extra Star, 24c; Elaine, 25c; Water White, bulk, in tanks, 14c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 55c; cs., 60c; No. 1 bbl., 45c; cs., 50c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Crude Petroleum Oil, 8c; cs., 13c.; Whale Oil, bleached, 45c; Cocoa, cs., 55c.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, Money loaned mines, Mining companies organized, their property reported, financed and managed, Mines, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, Examine mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and Chemical work done. EDW. N. BREITUNG, Marquette, Mich., U.S.A. CABLE ADDRESS, EDBEE. CODES: LIEBER'S, BEDFORD MCNEIL'S, A B C UNIVERSAL COMMERCIAL.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from J. F. Cowdery, in the Lucky Point Mine, near St. Louis, Sierra Co., to deposit tailings in a worked-out pit; from Chas. S. Diesem, in the Riffle Point Claim, at Grass Flat, Sierra Co., to deposit tailings in Grass Flat Ravine; from Morris J. Williams, in the Weeds Point Mine, near Camptonville, Yuba Co., to deposit tailings in a ravine; and from E. A. Moody, in the Inskip Placer Mine, at Gold Run, Placer Co., to deposit tailings in Squires Ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 29, 1900, at 1:30 P. M.

San Francisco Stock Board Sales.

SAN FRANCISCO, Jan. 11, 1900.

9:30 A. M. SESSION.

500 Ophir.....69c	500 Belcher.....10c
200 Challar.....24c	400 Sierra Nev..45c
200.....27c	100 Union.....27c
300 Crown P't...11c	

2:30 P. M. SESSION.

500 Ophir.....69c	100 Utah.....03c
100 Mexican.....31c	500 Bullion.....04c
100 B. & B.....23c	100 Justice.....03c
200 C. C. & V.$1 45	200 Alta.....03c
50.....$1 40	100 Caledonia...50c
100 Belcher.....11c	200.....49c
350 Sierra Nev'a.45c	300 Challenge...20c

FOR SALE.

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A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited. H. E. RUNKLE, Mining Broker, El Paso, Texas.

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Single claims and groups. Large gravel properties, dredging and hydraulic. Undeveloped copper properties. PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.

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FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MacBETH, Equitable Building, Denver, Colorado.

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For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

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Position Wanted

By Experienced Metallurgist and Mining Engineer, preferable in charge of a cyanide plant or as chemist and assayer. Thoroughly familiar with all processes for gold extraction. Technical graduate. Best of references. Salary moderate. Address W. C. A., care this paper.

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Wanted.—Foreman for Twenty-Stamp Mill.

One hundred and fifty dollars per month and board. Address THE WM. HAMILTON MFG. CO., 316 S. Euclid Ave., Oak Park, Illinois.

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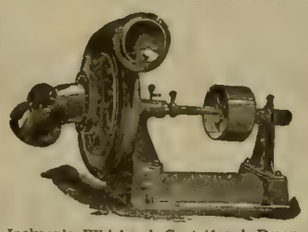
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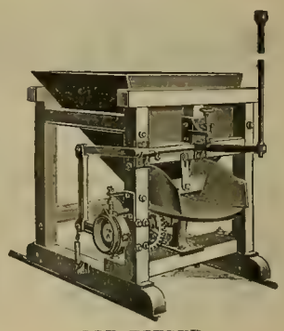
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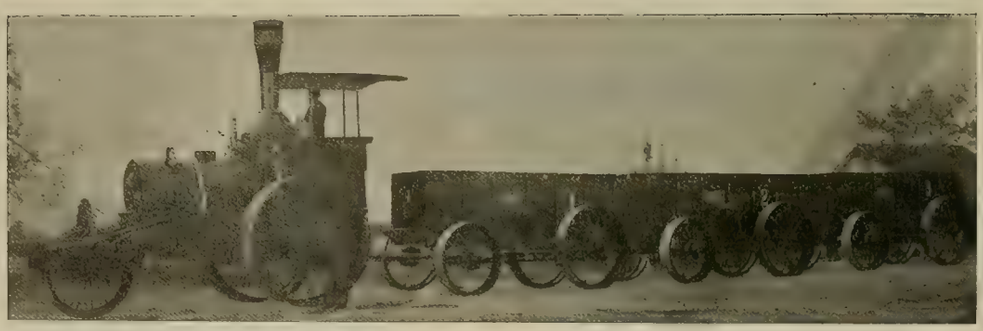
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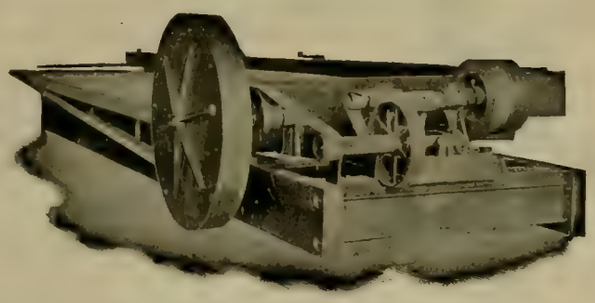
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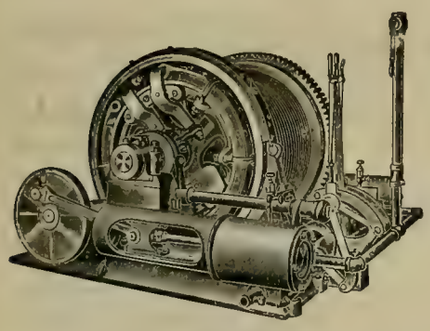
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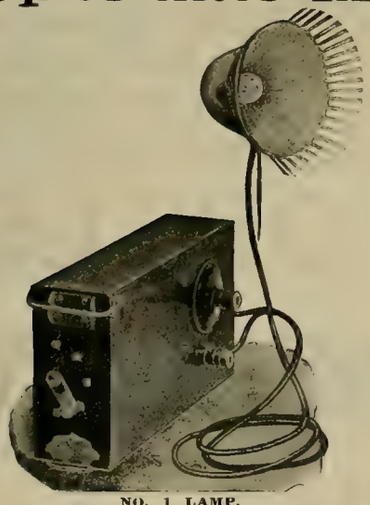
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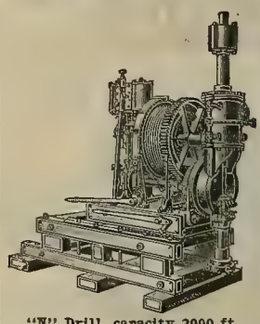
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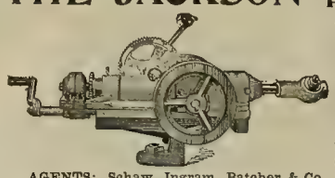
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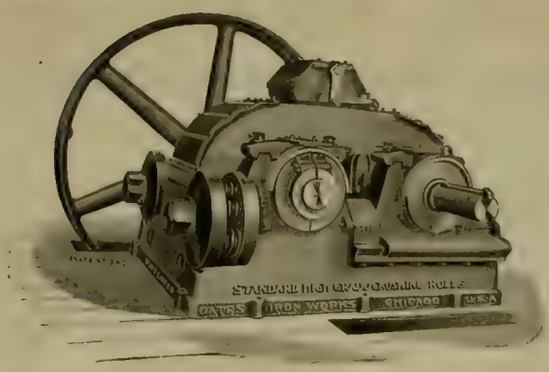
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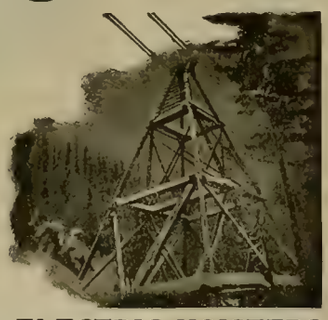
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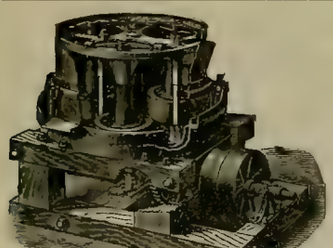


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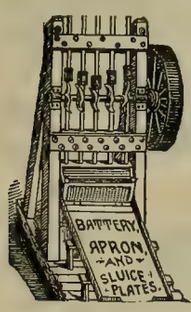
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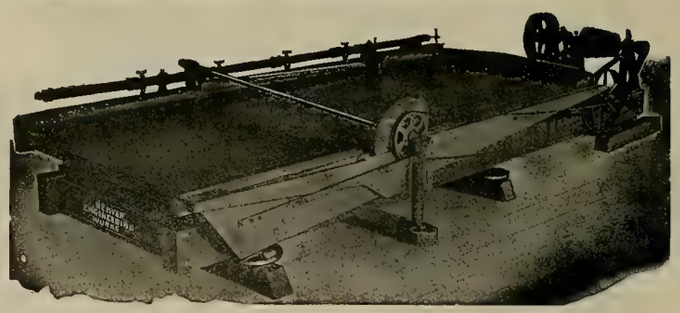
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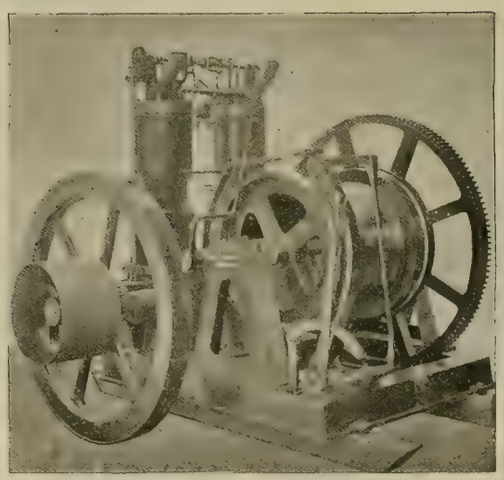
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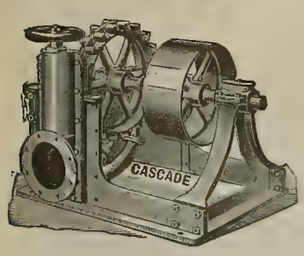
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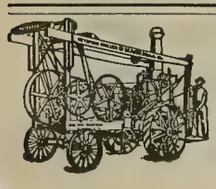
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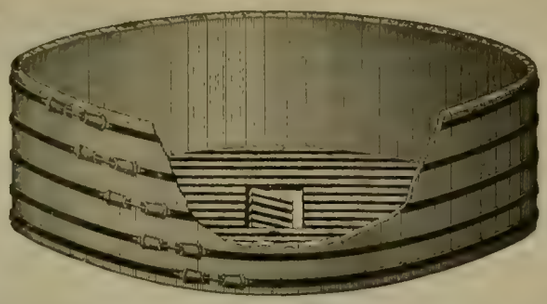
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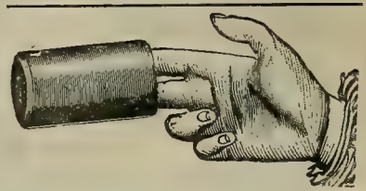
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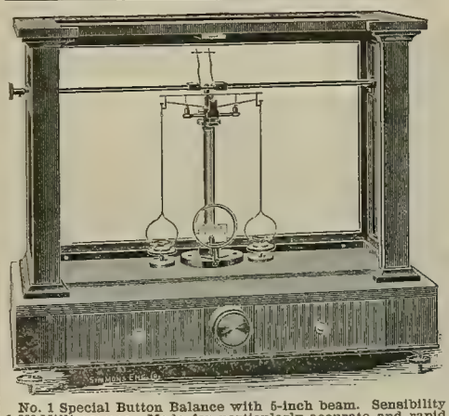
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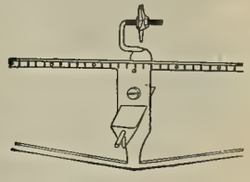
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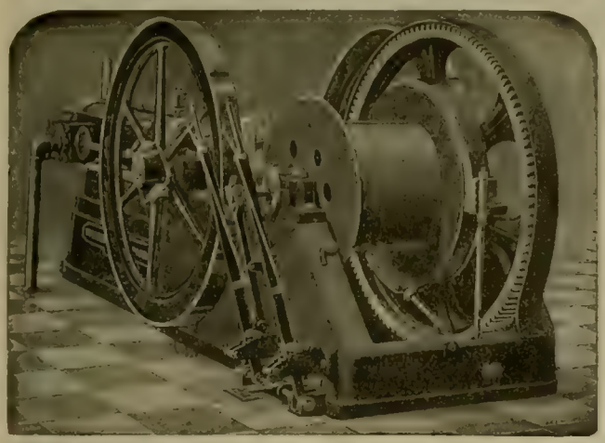
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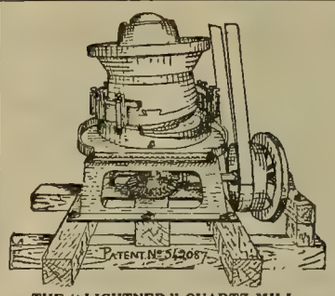
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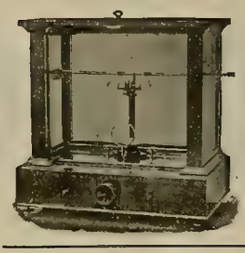
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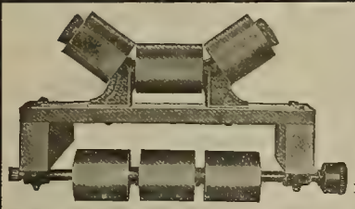
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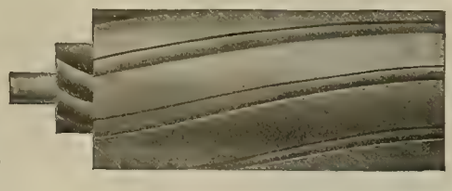
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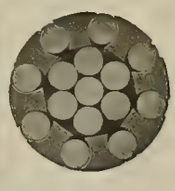
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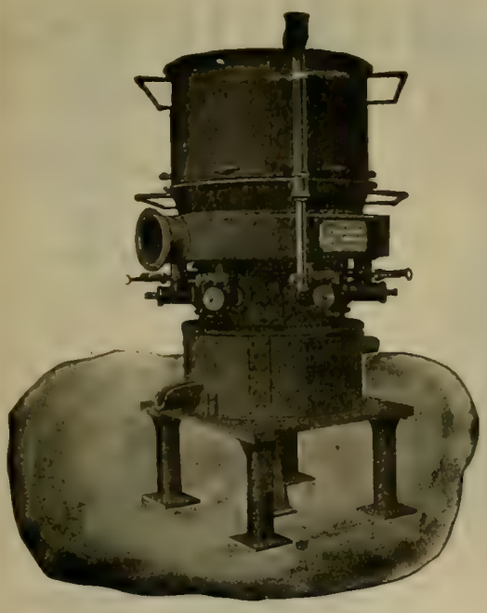
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THIS CLASS OF WORK IS A SPECIALTY WITH US.

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(SEE PAGE 53.)

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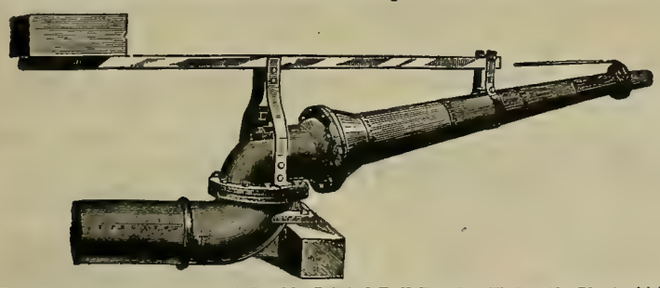
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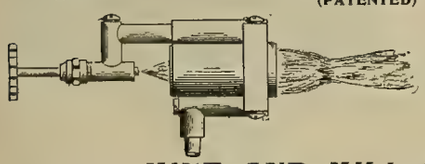


The above presents an improved **Double-Jointed Ball-Bearing Hydraulic Giant** which we build. The improvement consists of the introduction of a **Ball Bearing** by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.

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A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. **Price $6.** For sale by

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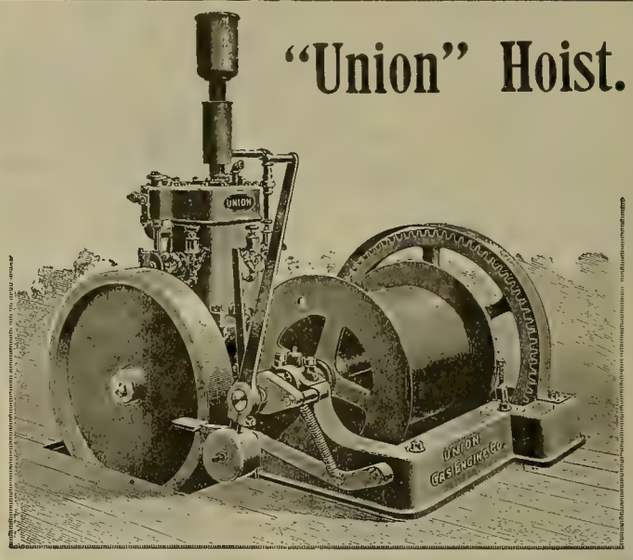
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The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton 125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over 600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

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— BUILD THE —

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Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
"UNION" COMBINED HOISTS in Sizes from 3 to 40 h. p.
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"UNION" ENGINES Are In Use All Over the United States.
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FOURTH AND CHANNEL STREETS,
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ASSESSMENT NOTICES.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of December, 1899, an assessment (No. 22) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 27th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 22) has been postponed to THURSDAY, the 25th day of January, 1900, and the day of sale from the 27th day of January, 1900, to SATURDAY, the 10th day of February, 1900.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office, Room 31, No. 214 Pine street, San Francisco, California.

SOUTH PALOMA GOLD MINING COMPANY, Limited.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Directors, held on the 6th day of December, 1899, an assessment (No. 1) of six-tenths (6-10) of a cent per share was levied upon the capital stock of the corporation, payable immediately to the secretary, John F. Barnett, at Room 22, No. 222 Sansome St, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3rd day of February, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on the 19th day of February, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

JOHN F. BARNETT, Secretary.

Room 22, No. 222 Sansome St., San Francisco, Cal.

QUINCY MINING AND WATER COMPANY.—Location of principal place of business, San Francisco, California; location of works, Spanish Ranch, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of January, 1900, an assessment (No. 2) of forty cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 439 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of February, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 5th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

THOMAS QUIGLEY, Secretary.

Office—No. 439 California street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of January, 1900, an assessment (No. 10) of five cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of February, 1900, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 5th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

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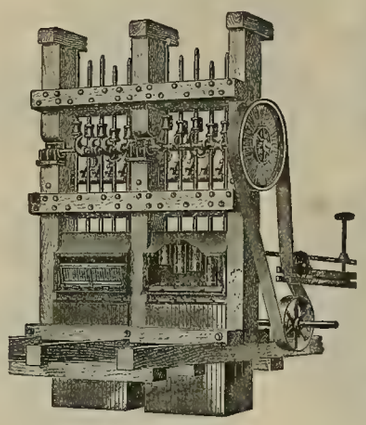
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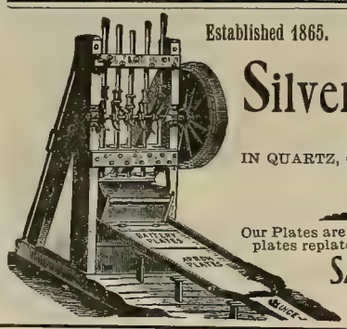
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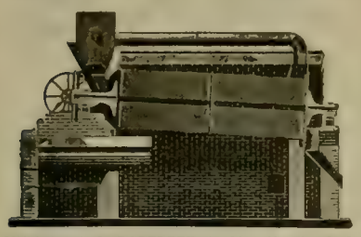
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LEVER UP, Oil Dropping;
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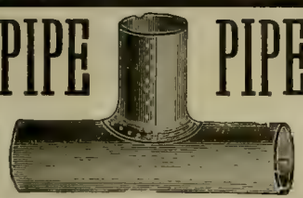
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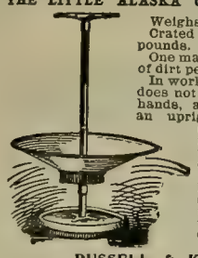
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In working, the operator does not have to wet his hands, and can stand in an upright, natural position, and does not have to hold the weight of the dirt in his arms.
Requires very little water and saves more gold than any other washer. Send for Circular.

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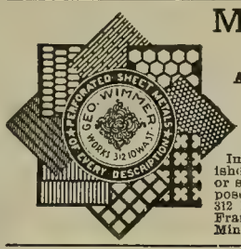
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And Other Chemicals for Mining Purposes.



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A SPECIALTY.

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In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.



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Owing to greatly increasing business we have been compelled to seek larger quarters. We are now at 141 and 143 First street, where a full line of Stationary, Marine and Hoisting Engines is carried in stock, and sizes of each in running order so that intending purchasers can see them in operation.

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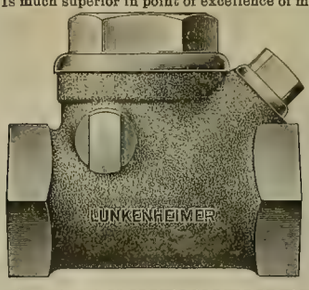


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Is much superior in point of excellence of material, design and workmanship to any other valve of its class upon the market. The body is heavy and well proportioned, the seat is carefully finished and the workmanship is first-class. This valve is so designed that when the disc is raised the passage through the body is fully equal to the diameter of the connecting pipes.

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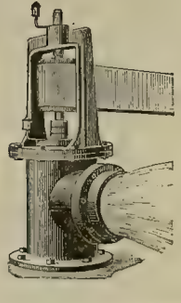
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Wood's Propeller Pump

Stands pre-eminent. No gearings, valves, cylinders, plungers, exposed bearings or packings. There is economy, convenience and rapidity in sinking with this unique and reliable pump. Send for Catalogue.

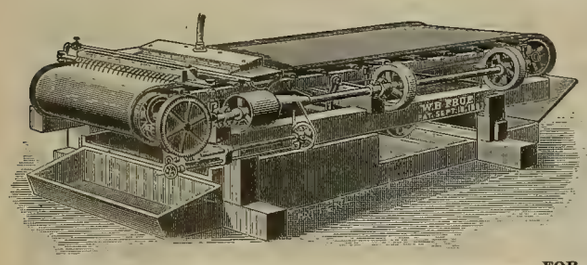
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We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

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THE "JAMES" ORE FEEDER,

as illustrated on this page, is a machine of improved design for the automatic feeding of ores to stamp batteries and other crushing machinery. It is perfectly adjustable while in operation, and will feed equally well ores wet or dry, coarse or fine.

Shipping weight, with wood frame, - 800 pounds.
" " " iron " - 1000 "



ADVANTAGES

The advantages of this ore feeder, over any others that are in the market, are, that the feed is positive and will not gig back no matter how slight the motion to the arm; it can not possibly spill ore of any character and will definitely measure out from one to fifty tons per day of any class of ore.

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No. 2063. — VOLUME LXXX. Number 3. SAN FRANCISCO, SATURDAY, JANUARY 20, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Portraying California Mining.

In the handsome and valuable volume "California Mines and Minerals," prepared for the visiting American Institute of Mining Engineers, appear many views of varied mining operations in the State of California, and through the courtesy of the compiler, Mr. E. H. Benjamin, secretary of the California State Miners' Association, a few are herewith reproduced. In the great gold area of the second largest State in the Union, covering an area of 160,000 square miles, are many different forms of gold mining, and on the principle that the best process is the one that pays the best, anything and everything from an arrastra to a fully equipped 200-stamp mill, and from a primitive pipe to the modern electric transmission is used. The first picture portrays an ancient arrastra in Trinity county, in the northern part of the State, which has ground out many a good gold dollar for its owner. Hydraulic mining, as carried on in Tuolumne county, is portrayed in the picture on the right of that of the arrastra, and just below this line is shown how a gravel channel is prospected for by boring in Siskiyou county. Next to it are depicted the hoisting works of one of Amador county's great gold producers; below it appears a portrayal of the mouth of a shaft in another deep quartz mine of Amador county, with a big dividend record and a recent new lease of auriferous life. Amador county holds deserved prominence in proving that California mines "go down," and that surface scratching which has produced over a billion dollars gold but indicates the great extent of California's gold-bearing area, and that "sand" and science combined make deep quartz mining in California a profitably paying proposition. The large number of technical articles published in this paper from many of Amador county's progressive mining men have shown in detail how deep mining in California progresses. Beside the brief mention herein, the Kennedy, the Oneida, the Argonaut and the Wildman-Mahoney may be cited as examples. The picture in the lower left-hand corner shows a part of the apparatus used in a representative California hydraulic mine, where a hydraulic elevator is being placed at the Mammoth bar, in one of the richest gold sections of Placer county, Cal.



Carr's Arrastra, Northern Trinity Co., Cal.



Hydraulic Mining, Tuolumne Co., Cal.



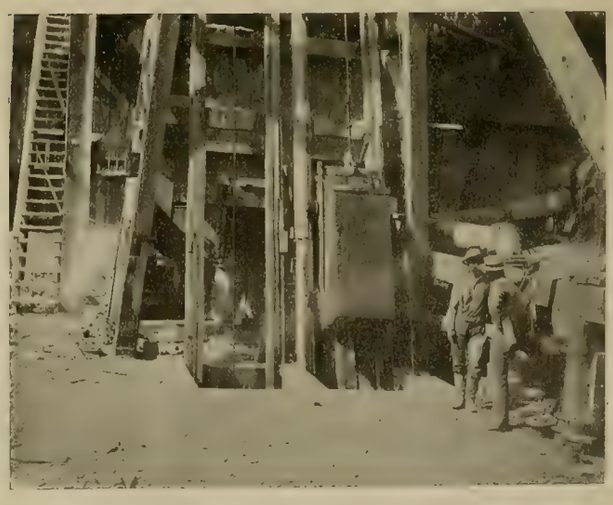
Prospecting a Gravel Channel by Boring, Siskiyou Co., Cal.



Hoisting Works, Zeila Mine, Sutter Creek, Amador Co., Cal.



Hydraulic Elevator in Pit at Mammoth Bar Mine, Auburn, Placer Co., Cal.



At the Mouth of a Shaft a Half Mile Deep, Amador Co., Cal.

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THE intent of the Federal mining law is to reward the discoverer, and as a mineral discovery is almost almost always made upon the apex it does this by giving to the owner of the apex the ownership of the vein to any depth. Mining litigation as to extra-lateral rights often arises from the contention that the owner of overlying surface—who is not the discoverer and owns no portion of the apex of a vein—is better entitled to the ores than he who discovered the vein and does own its apex.

FOR some years prior to '93 Colorado was the leading producer of silver of any State in the Union. Upon the slump in silver Colorado virtually said, "Is it gold that is wanted? Very well, gold it shall be," and straightway began turning out gold till since '97 it has been the leading gold-producing State of the Union. Its mines of lowest altitude begin at about the same elevation as most of those of California's highest altitude. Colorado is well supplied with railroads, and those railroads work for the mineral development of the country from which they derive their support.

THE 12th census of the United States will be taken next June. Section 8 of the census bill specifically provides for the collection and publication of statistics regarding mines, mining and minerals. That part of Section 8 relative to mining reads as follows: "To mines, mining and minerals and the production and value thereof, including gold, in divisions of placer and vein, and silver mines, and the number of men employed, the average daily wage, average working time and aggregate earnings in the various branches, and aforesaid divisions of the mining industry: Provided, That the reports herein authorized relating to mines, mining and minerals shall be published on or before July 1, A. D. 1903."

A MINER left Eureka, Nevada, last week to attend to some claims of his in Nye county, Nevada, the county next adjoining, about 100 miles distant. He traveled to Palisade, Nev., thence to Sacramento, Cal., to San Francisco, to Mohave, to Manse, Arizona, thence by stage to his destination, nearly 2000 miles to get 100 miles away. Such roundabout travel is not as much of a necessity as it was a few years ago. As requirements open it becomes easier to travel, and if it is worth while railroads will be built anywhere. The Klondike is nearer San Francisco to-day than certain parts of California, but did mineral development demand there is no part of the west half of America that would not be readily reached by rail. To an Eastern reader it may seem singular that a man should have to traverse two States and a Territory to get to the next county, but in this case he doubtless took the quickest and easiest route.

Patentable Ideas.

This week are received two letters—one from northern California, the other from Idaho—asking if certain alleged improvements in mining devices are patentable. Each expresses the belief that a new and valuable idea is involved, that he has a valuable improvement, but that the long-continued and general use of the mining apparatus mentioned may preclude the possibility of patent. That is a mistake. No matter how old or widely used a machine of any kind, if susceptible of improvement, such improvement is just as much a legitimate subject for patent as though the machine to be improved had never been heard of. "What is an invention?" has been asked countless times, and courts are constantly called upon to decide what is or is not an "invention." Without attempting to be legal or exact it is believed that an "invention" is an original adaptation of some one of the five mechanical powers, or the exercise of original thought in connection with a patentable article, or the first sufficient answer to a new question, or the finding of a new and better answer to an old question. At first glance one would think that an ore concentrator, a fountain pen, a rock drill or a plow did not, by reason of the degree of perfection each has attained, offer any field for the inventive faculty; yet, weekly, patents are granted thereon for what are held by the Government patent office to be new ideas applicable to these mechanical devices. This week's official record gives an illustrated account of a patent on a monkey wrench. Our California and Idaho correspondents, if they really have devised an improvement on the mining machinery to which they refer, can go ahead and get their ideas patented. The first thing for each to do—provided he concludes to prosecute the idea to a conclusion—is to carefully and accurately prepare a clear, detailed statement of what he claims, and submit that to a competent patent lawyer who, after research, will give his opinion thereon; if favorable, he will send it to the patent office at Washington, D. C., where the examiner will decide whether or not the idea is patentable. His decision is final. If he concludes that there is sufficient originality in the idea submitted it will be for the devisor to say if he wants to go to the additional expense of securing a patent.

What constitutes an invention is a matter of constant discussion; sometimes a very little thing is an "invention," and a valuable one. Recently the direction in which a little hole was bored in cast iron became a matter of invention, and was patented. This is doubly noticeable because the boring of the hole had gone on unintentionally before its value was recognized. In fireplaces, gas is often introduced into cast-iron imitations of logs with imitation moss made of asbestos, the whole thing looking ornamental when lit. It is necessary that the gas flame should lie close to the cast-iron "logs," and that there should not be a little explosion when the gas is turned off. This is secured by drilling the little holes through which the gas comes out at a sharp angle to the surface of the log. These logs are half round, and it was the custom to lay them on a driller table to have several rows of holes drilled in them, and the boy who did the drilling found it convenient, by reason of the way the log lay, to drill part of the holes inclined and part at nearly right angles to the surface of the log. It was found that, if all the holes were drilled at the same acute angle, the outer opening higher than the inner opening, that there was no explosion at starting or stopping the gas fire, that the flame lay close to the log, there was more heat for the same amount of gas burned, and the thing looked better. Just the direction of boring a little hole in a cast-iron "gas log" didn't seem much, but the idea was patented, and, like other ideas, had considerable commercial value.

Our advice to our correspondents is to go ahead on the lines indicated; and if it appear that they can improve upon existing forms of mining machinery, it will be a benefit all around—benefit to the users of such machinery forever, and, incidentally, to themselves if they succeed in profitable use or transfer of their inventions.

Good Roads Necessary.

With good roads as a text, Hon. Jno. F. Davis of Amador county, Cal., gives a local paper several good pointers on their necessity to the mining industry of the several counties. He points out the patent fact that to the county mining organizations should rightly be delegated such work, that each county must immediately or ultimately depend upon itself to have such work done, and that as an adjunct and salvation to the mining industry it should not be a silent precept, but an active duty. With the greatest gold district on earth California lags; rightly developed, the steady thunder of stamps should be heard throughout the entire 700 miles of the State's length along its axial line. California's yearly gold yield should be thirty millions instead of fifteen. No matter how great the resources, how rich the mines, how promising the outlook for profitable output, the plain fact is that California, the home of scientific mining and advanced miners, is no longer at the head of the procession. Why this is has been repeatedly shown in these columns and universally agreed to. A wide-awake miners' organization in each county, a crystallizing of public spirit and a general pressure of public opinion are necessary. A good beginning would be in the matter of roads. Take up any California paper published in a mining district of the State and the first item is, in speaking of a mine, "machinery awaits the workers at the depot, but just now an empty wagon couldn't be hauled to the mine." Millions of dollars are annually lost to the State by such apathy. Hydraulic miners complain of the tribute levied on them by small, miserable creatures belonging to antagonistic associations, but such tax is light in comparison with the tax annually levied by the quartz miners upon themselves by their system or lack of system of county roads. The remedy is organization. Everywhere throughout the mining counties miners are in the majority. Organize, elect supervisors pledged to build roads and see that they keep their pledges! Mr. Davis says "the question is how to get the necessary money." The way to get it is to levy a tax and—most important of all—see that the money collected is spent with some regard to intelligence and economy.

IN an arbitrary and unbusinesslike way Colorado smelters are advancing the price for treating Cripple Creek ores. Such action is arbitrary because it goes on the assumption that they have a "cinch," and can charge what they please. It is unbusinesslike, because business is the systematic supplying of wants, and it isn't business to act so that customers or patrons grow dissatisfied for cause. Cripple Creek mine owners have protested, but the protests have been unheeded. Accordingly they will act. While storing their ores awaiting a cheaper treating process they are discussing the joint creation of cyanide and chlorination plants and a smelter. In Requa gulch the Woods Investment Co. have put in a 350-ton-daily chlorination plant, which works successfully. Other large concerns feel that their patience has been abused and that the best remedy for imposition is to help themselves. J. B. Grant, the Western manager of the smelter combine, says that "there was no money in treating Cripple Creek ores on the old basis," and that it is only in Cripple Creek that there is any advance. The reason for the last statement is manifest. The assertion that the former treatment of Cripple Creek ores was unprofitable is best answered by reference to the statements made by Mr. Grant and his confreres when the combine was in process of formation.

DIRECTOR OF THE U. S. MINT ROBERTS has laid out a big task for himself—no less than to find out where all the gold goes to; how much is used in the arts and industries, etc. He says he will send letters to sixty thousand people—photographers, dentists, gold and silver workers, jewelers, painters, gold-leaf workers, embossers, etc.—to find what amount of gold each uses in a year. It is estimated that in the United States such annual consumption of gold amounts to $12,000,000; that in this country alone $5,000,000 annually goes to the filling of teeth, $2,000,000 yearly plastered over buildings as gold leaf on signs, etc. M. H. Gournay calculates that the world absorbs $125,000,000 gold per annum.

Concentrates.

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IN 1898 California produced 541 long tons manganese, average value $5.96 per ton.

AUSTRALIA continues to ship zinc sulphides to Europe, but expects to treat them locally.

A DRY concentration method of separating manganese ores is furnished by the Wetherill Separating Co., New York City.

A TECHNICAL ARTICLE on the leaching process for copper ore, specially written for this paper, appeared in the issue of April 16, '98.

ABOUT twenty-five American soldiers have returned to San Francisco from the Philippines, insane, which ought to be pointer enough for American miners.

THE "flat rate" no longer exists at Arizona smelters; the increase in railroad facilities and corresponding reduction in freight rates is also a help to the development of that rich country.

FASHION has a good deal to do with mining investments. For some years California mines have not been unfashionable in London. Of late they have become fashionable in Boston.

UNDER a head of 100 feet, through a 3-inch nozzle, a pipe would (theoretically) discharge about 4 cubic feet per second; in actual practise about 3, or, approximately, about 109 miners' inches.

THERE is gold in Nicaragua, and on both the Pacific and Atlantic side free-milling ore is treated in several mills, but no American miner should think of going there looking for employment.

DRY and oil lubricants each have their admirers; the best is that which needs the least renewal and most obviates friction. For light and fast running machinery fine oil deservedly continues in favor.

THE constant fall in the price of chemicals may cause the business inconvenience to producers always consequent upon competition, but the benefit the public derives always outweighs any individual loss.

PRESTON'S California Gold Milling is the best book on that topic. It is out of print, but a copy may be picked up second-hand. It was published in its entirety in this paper, and back numbers containing it can be procured.

APPRECIATIVE contemporaries that appropriate whole pages from this paper without credit are kindly reminded that the contents of this paper are copyrighted, and permission must be secured for republication of any of the contents of any issue.

THE violent pounding mentioned by B. D., Los Angeles, Cal., may be occasioned by the force pumps for feeding the boiler being set on an elevation above the level of the feed water in the heater if the temperature of that water approximate 212° F.

WHEN radiant force is exercised through space from a point, its intensity varies inversely with the square of the distance. Thus the intensity of light radiated by a luminous point at twice the distance therefrom is of one-fourth the intensity it had at the distance in question.

IT is not understood that gold is precipitated in the cyanide solution, but is deposited, and for this deposition the zinc threads are required. It is patent, also, that oxygen must be present before gold will unite with potassium cyanide. The entire process is chemical—not mechanical.

IN constructing or buying mining machinery for specific purposes it is as important to take into consideration specific gravity as hardness. The specific gravity is the volume, hence the capacity of an ore crusher is largely determined by the specific gravity of the material to be put through.

NOW is the proper time for claim owners with delinquent partners to advertise those out who have failed to contribute their proportion toward the annual labor required by law. It takes nearly six months to oust a delinquent co-owner — ninety days for publication and ninety days thereafter.

A SLUICE 12 inches broad, 6 inches deep, to give a velocity of 320 feet per minute, should have a grade of 56.18 feet per mile, or 1¼ inches per box of 12 feet. For ordinary gravel about ten tons water per cubic yard is none too much. Cement gravel, after blasting, would require about 50% additional.

NEVADA COUNTY, CAL., at present furnishes ice in crystal slabs from one end of the county, oranges in fullest ripeness from another part, and gold in plenty from her quartz and placer mines. Great is California! Nevada is one of the smallest of its fifty-seven counties, but this illustrates its resources.

IT is not practicable to get details of the process of depositing copper electrolytically in the form of sheets and tubes direct from the matte or precipitate. The result of the latest experiments in that direction, which from a laboratory point of view seemed to be a success, was given in a column article in the issue of Nov. 18th, '99.

USEFUL minerals are constantly being found in the Western mining regions and frequent projects made for their supply, but not always of commercial value, because cheaper supplies can be imported, ofttimes as ballast, and nearly always in such a way as to enable their being laid down at less cost than furnished from American sources of supply.

UNDER Russian law all gold and silver produced in that country must be registered and brought to the Imperial Mint, which has agencies for its reception established at convenient points. It is probable, however, that a considerable amount of gold is concealed or otherwise fails to reach the Russian Mint. The '99 product is estimated to have been $10,000,000.

THE great drawback to Western Australian gold fields is lack of water. Dry processes do not work satisfactorily; dry crushing by rolls never works well with ore containing talc and kaolin, going into a fine impalpable powder, and stamps, plates, pans and slimes need plenty water. Water is the one thing needful to make that gold mining region a prosperous one.

BISMUTH output and price is said to be controlled by a "ring," composed of the ore producers, the Government of Saxony, and Johnston, Matthey & Co., of London. Each mine can participate in the annual sale proportionate to its producing capacity. This arrangement is said to be in existence since January, '97, with satisfactory results to the producers and vendors.

THE latest meeting of the American Institute of Mining Engineers was held in San Francisco last September. The next meeting will be held in Washington, D. C., February 20, 1900. Hon. Charles D. Walcott, Director of the United States Geological Survey, is chairman of the local committee and Mr. E. W. Parker, Chief Statistician of the Survey, secretary of the local committee.

THE circulation of this paper is limited to mining men, to whom it is generally acceptable. It is believed that this paper weekly reaches more mine owners, mine officials, and men interested in mining than any other publication, and is thus the best advertising medium in the United States through which manufacturers of mining machinery and supplies can make their business known.

UNDER a recent ruling by the U. S. Land Office, in all selections for unsurveyed lands under the Act of June 4, '97, notice of the selection must be given for a period of thirty days by posting upon the land and in the local land office and by publication at the cost of the applicant in a newspaper designated by the register as of general circulation in the vicinity of the land and published nearest thereto.

VISITORS to San Francisco will find at this office, sixth floor, 330 Market street, papers from all parts of the world, books of reference and facilities for correspondence. Mining men passing through or sojourning in San Francisco are cordially invited to make this office their headquarters while here. They can have their letters addressed care this office, and promptly receive them upon arrival.

AT the quicksilver mines of the Asturias, in Spain, the ore does not average more than $\frac{1}{10}$ of 1%, it being thus necessary to treat five tons of ore to produce one flask of quicksilver, and, hence, requires very careful treatment. The percentage of quicksilver in the New Almaden, Cal., mines is greater. At the Guadulupe and El Quiote mines at Guadalcazar, San Luis Potosi, Mexico, the ore averages 1%.

TIN, with a little silver added, makes a solder for aluminum. The solder is heated till it melts, and applied to the warm surfaces of the aluminum with a brush of aluminum wire; then the two surfaces of aluminum are pressed together. Delecluse employs a solder of tin, 48 parts; zinc, 24; lead, 24; aluminum, 3½; chromium, ½ a part. Biesalbert uses one of zinc, 56 parts; tin, 28; aluminum, 9; nickel or silver, 7 parts.

NO miner or engineer ever learned, or ever will learn, practical mining or engineering from a book, and sets of questions forming a sort of catechism, with more or less appropriate answers, even if learned "by heart," will not make a miner or engineer of any one. These things have their place and possess some merit, but nothing can take the place of actual work and experience. And no one who never made a mistake ever amounted to anything, in mining or anything else.

THE Comstock, Nevada, lode yielded over $150,000,000 gold. In the palmy days of bonanza, Con. Cal. & Va. ore went 46% gold, 54% silver. At Silver City, five miles south of the Comstock, gold has been mined for forty years. The richest mine in the State is the De Lamar gold mine, in the extreme southeastern part of the State. Nevada has been described as "a sucked orange," but mistakenly, and that commonwealth will yet come to the front.

THE article on mine ventilation in last week's issue is conclusive answer to G. L., Tesla, Cal. Miners deceive themselves when they place entire reliance upon a copious supply of ventilating air with its consequent high velocity, for the most markedly conspicuous feature of all extensive mine explosions is the fact that roads which are not haulage ways, and through which the air courses at only moderate velocities, are exempt from the effects of explosion.

IN electrical work, increasing the distance, and, consequently, the length of wire, (other things remaining the same), will proportionately increase the distance and the loss of power; but, if the cross-section of the wire is increased in the same proportion as its length, the resistance and loss will remain the same. This, however, increases the weight of the wire as the square of the distance. Hence the law: For a given power and electromotive force (which fixes the current), the cost of copper, for a specified percentage of line loss, varies as the square of the distance. The final deduction: If the voltage is increased in proportion to the distance, the cost of wire for transmitting a given power with a specified line loss remains constant.

PLACER DEPOSITS usually rest upon comparatively hard rocks, often schists, slates and shales, which are eroded in most instances, and show clearly the effects of the gravel-laden streams that ran over their surfaces, especially when, as is often the case, these old formations that constitute the bedrock of the gravel deposit have been tilted up at high angles. The bedrock is often altered and softened by the action of the water for a foot or two below the bottom of the alluvial deposits.

THE Siemens & Halske electrolytic method of deposition is adapted to some ores. It is effected by passing the gold-bearing cyanide solution slowly through vats or troughs filled with alternating anode (iron) and cathode (lead) plates, which are allowed to remain undisturbed for several weeks, when the cathodes, plated with gold, are removed, melted and cupelled. About 8000 square feet of cathode surface is required to electrolyze 100 tons of solution in twenty-four hours. The consumption of current is small, 4 or 5 electric H. P. sufficing to run a large plant.

THE Sheffield Technical School, from elaborate experiments, has discarded the idea that the reason that a red-hot steel becomes flint hard when suddenly quenched in water is that the shock drives the molecules of the steel into closer contact, occasioning hardness. The metallurgical department of that school claims to have demonstrated that the hardness of such quenched steel is due to the presence of a sub-carbide of iron, and that the temperature is due to the fact that far below red heat this compound decomposed and diluted the mass of soft iron. It is also asserted that the permanent magnetism of steel depends upon the amount present in the compound.

A 24-INCH BELT running 250 feet per minute would carry per hour about 93 tons of material, weighing 2700 pounds per cubic yard. The belt being 24 inches wide, the load may be considered as a triangle standing on its apex, with a base 12 inches wide and a height of 3 inches. Therefore, the area on its cross-section will be 18 inches, and there will be 18x12=216 cubic inches, on each foot of the belt. If the speed be 250 feet per minute, there will be delivered from the end of the belt 250 times 216 cubic inches, or 54,000 cubic inches per minute, or 31¼ cubic feet per minute, or 1875 cubic feet per hour, weighing 187,500 pounds if 100 pounds per cubic foot, or about 93 tons hourly. If the width of a belt is double it will carry four times as much material, and if tripled, nine times as much.

THE ordinary method of reducing zinc by distillation depends upon the fact that it volatilizes at its temperature of reduction. The boiling point of a liquor depends upon the pressure, so that by increasing the pressure in the furnace it should be possible to prevent the volatilization of zinc. The necessary pressure is the vapor pressure of zinc at its temperature of reduction (or at the temperature of the furnace). At 76 cu. cm. pressure the boiling point of zinc rises about 1.5° C for each centimeter, so that the vapor pressure of zinc may be estimated at about five atmospheres at 1,500° C. However, this temperature is never obtained in zinc furnaces; probably 1,200° would be average. Besides, zinc and lead alloy at high temperatures. Hence, a pressure of three atmospheres should suffice.

WHEN poured into a mould in a state of fluidity cast iron expands at the moment of solidification, thus giving a sharp impression in the mould. The expansion, slight but noticeable, extends, until, in the process of cooling, the iron attains the stage of red heat. Concentration then takes place, with the result that the cooled iron is noticeably smaller than the mould. In making patterns for iron castings, therefore, pattern makers commonly allow about one-eighth of an inch per foot for shrinkage. The shrinkage in castings, however, is not a constant: it varies materially with the proportion existent in the pattern and the character of metal used, as much as one-tenth of an inch per foot being allowed when casting iron beams and about one-thirty-second of an inch in casting large cylinders. Charcoal iron has a higher melting point than that of less pure iron made with coke.

DRY amalgamation of gold has long been "an iridescent dream," the nearest solution of that metallurgical problem having been some time ago afforded by a London inventor who contrived a machine consisting of an iron tube 4 inches in diameter, bent into a spiral form of four turns, with suitable connections. In the bottom of each spiral turn eight pounds of mercury is poured, forming a pool, but not closing the pipe. A blower is attached to one end of the tube, near which is a feeding hopper, the other end being connected to a dust settling chamber. The intention is to blow the finely crushed and absolutely dry ore through the spiral and over the mercury pools. These latter are dashed about, and sprayed by the action of the air current, and the particles of ore are brought into contact with the mercury, which amalgamates and retains the gold. The gold which escapes the pool in the first spiral is carried along to the second, third and fourth, and by the time the ore has run the gauntlet of these four, it is said to have parted with the bulk of its gold contents. At the end of the run the mercury is taken out, the amalgam extracted and retorted.

The Switzerland of Colorado.

Written for the MIN NG AND SCIENTIFIC PRESS by T. A. RICKARD, State Geologist of Colorado.

In no part of the world have the picturesque vicissitudes and rude realities of mining received so telling an illustration as in that mountain land which has made the poetry of Colorado history. The "Silvery San Juan," as it was proudly called before the days of 1893, includes six counties, in the southwestern corner of the State, whose melting snows drain into the San Juan river, a tributary of the darkly flowing Colorado. It is a region outside the beaten track of tourist travel and therefore is but vaguely known to many as suggestive of rich mines and thundering snowslides inextricably blended in a mist of romance. Nevertheless it is as interesting to the men of affairs as it is attractive to the artist. No mining country so well illustrates the application of technical science to industrial development, and in no region has the resistless energy of American enterprise found a more magnificent field.

Only those who have climbed over the ranges can have a true appreciation of the intrepidity of the men who ply their calling far above that line which, like the shore of an ancient sea, stops the aspiring pines from trespassing upon the trackless snowfields. The ranges have long since been invaded beyond this "timber line," and many a wreath of smoke tells of the fact that the unresting wheels of ponderous machinery have been put to work where once the mountaineer scarce ventured. We hear much of the pluck and daring of the men who traversed the desert and



The Pioneers of the San Juan on the Mountain Trail, Baker's Park, Colorado.

penetrated the recesses of the Sierra Nevada, but it has often required more skill and courage to go ten miles among the snowfields of the San Juan than to roam the whole length of the hills which Bret Harte has illumined with the afterglow of his romance.

An early Government report records the opinion of a departmental surveyor that the canyon of the Animas below Silverton would remain impassible to man and mule. Even the cat-like Indian climbed the cliffs and passed over the high plateau rather than invade the gloomy defile which had won for the river its Spanish name of "Rio de las animas perdidas," the river of lost souls. The redskin, the trapper and the miner each in turn avoided the inferno of that dark and tumultuous gorge, yet to-day the overhanging cliffs echo the shrill scream of the locomotive and the train glides smoothly from the Cimmerian gloom into the sunlit gladness of the open valley. First came the trail of the hunter, then the pathway of the surefooted mule, and when a long succession of heavily laden caravans had brought down enough valuable ore to incite the ambition and cupidity of larger minds, the toll road was surveyed with a view to its ultimate utilization as the gradient for a railway.

Such was the evolution of the transport system of the San Juan, and nothing better illustrates that adaptation to environment which characterizes all intelligent development. The commercial results have been striking, as can be sufficiently instanced by a few figures. In 1876 ore was carried by mules to Del Norte and thence by train to the smelter at Pueblo. The cost was $80 per ton. At the present time the freight is $8 per ton.

The penetration of the railroads into the mountain fastnesses has made a network of intercommunication which has permitted of the growth of smelting



Cathedral Spire, San Juan, Colorado.

centers at Silverton and Durango, particularly the latter, whose excellent coking coal enables it to meet the competition of the larger establishments across the range. And thus, in the course of time, difficulties have been overcome and hindrances removed until an extremely varied mining and metallurgical industry has been built up in the very heart of the once untrodden mountains.

The mines of this alpine country present many features of interest. The utilization of the energy of the mountain torrent and the transmission of power as electricity have diminished the difficulties due to inaccessibility, while at the same time the installation of wire ropeways of approved design has enabled the miner to derive a benefit from the difference of altitude and to obtain a cheap and most efficient method of transport. The late adoption of the multiphase current system has widened the field open to the electrician, and the lessened first cost of the Otto and Bleichert tramways has induced many to erect them. The results have been notable in many ways.

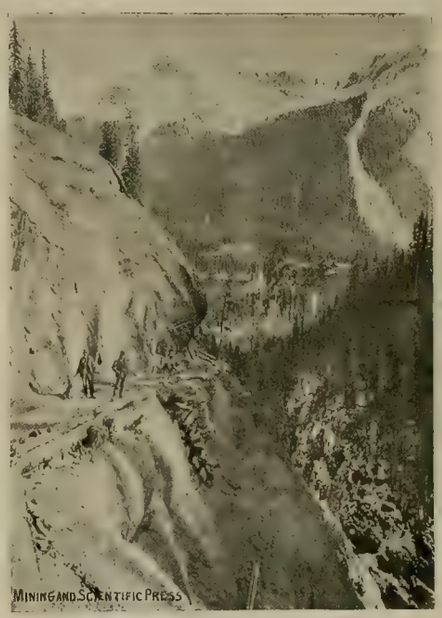
If you should happen to be among the mines when day is fading you will find the twilight magic with strange sights and sounds. Let me take you, for instance, to Savage basin near Telluride, a locality distinguished for successful mining. As you look towards the entrance of the mountain amphitheater the rugged peaks on either hand frame a picture completely typical of the great mining empire of the West. The sun has set. The snowclad summits, grey with an age beyond mortal imagining, in serene grandeur pierce the quiet of the darkening sky. Beyond, the light of day lingers upon the thread of the San Miguel river as it hastens down the valley and is lost amid the gloom of the overshadowing mass of Mt. Wilson. The hills, like flocks of unregarded sheep, cluster on the edge of the fading plains of distant Utah, where the mantle of night had already fallen. As sights become faint sounds become stronger. The sudden whistles from many engines announce that it is six o'clock. Groups of miners emerge from numerous shafthouses. A regular murmur as of machinery



Mount Abram, Colorado.

in motion draws attention to a bucket gliding along a steel rope overhead. Others succeed it in distanced procession, and the catenary curve of its flexible way makes a clear line against the snowfields. If you listen you can hear the noise of loading at the upper terminal, half a mile away, and by watching the descending buckets you can see them disappear down the hillslopes leading to the mill whose muffled thunder comes and goes like the voice of the sea when heard far inland. The darkness has obliterated the outlines of the landscape and yet the night is quickened with life and animation. The electric lights of distant shafthouses and mills dot the encircling hills and proclaim the unceasing activity of man. What a change from the quiet which brooded over these ranges scarce a generation ago! The sullen silence of the upper snowfields has vanished forever; the ambition of man, aided by the universal hunger for gold, has led his restless footsteps to the very cathedrals of the earth where now he pierces the sunlit surface to delve in the darkness for those things prepared for him since the beginning of the world. As you trace the faint outlines of the range, coronetted now with the glowing brilliancy of the multitudinous electric lights born of the energy of a far-distant torrent, as you hear the throb of machinery stealing over the snowfields, you realize something of the conquering energy of man.

The picturesque appearance of the San Juan is due to its geological structure. Analyze the anatomy of a mountain land and you will find that its external beauty of form is traceable to the unseen arrangement of the underlying rocks. The rugged peaks of the Ophir and Mt. Sneffles ranges have been sculptured by the patient hand of Time from the shapeless mass of a very peculiar rock. It consists of a series of tuffs and breccias, the consolidated fragments of a volcanic rock whose name has lately become popu-



On the Mt. Sneffels Road, San Juan, Colorado.

larly familiar because it characterizes the ore formation of Cripple Creek. I refer to the "andesite," originally so named on account of its prevalence among the Andes of South America, and now known to be a rock enclosing a great variety of very valuable ore deposits in different parts of the world.

As you examine the sides of the mountain amphitheaters of this region you will notice a regular arrangement, as of bedding, among those compacted remnants of another age; and in truth there is reason to believe that these volcanic ejectments were laid down under water, having been deposited in a lake bordering the scene of Plutonic activity. This formation has a thickness of many thousand feet and is traversed by ore-bearing fissures which have made it the scene of very extensive mining operations. The breccia has been penetrated by dykes of later andesite, and along the passageways so created mineral-bearing waters have laid down their freight of precious metal. Such in a general way are the geological conditions obtaining in the Telluride and Red Mountain districts. In other neighboring localities the later volcanic rocks have formed huge underground cores and where they reached the surface they have spread in thick masses which in succeeding times have been so shattered by earth movements as to become the channels for underground circulation and the consequent receptacle for ore deposits. The La Plata mountains and the hills guarding the upper Animas afford numerous studies of this type of structure.

These volcanic rocks belong to the dawn of the Tertiary period and are approximately contemporaneous with the andesites and phonolites of the Pike's Peak region. They overlie the earlier sediments in which also ore has been found. At Rico, for instance, gold and silver are won from the Carboniferous shales.

Although we can thus label the rock enclosing the veins, we cannot assert the age of the ore deposits which have been formed within them. There is evidence, however, pointing to an origin which is related to the intrusion, among the shales and limestones, of a volcanic product now appearing as dykes and intercalated sheets of porphyrite.

The geological distribution of the precious metals in



The Bridal Veil Valley, Colorado.

this part of Colorado is a wide one, ranging from the Silurian schists to the Cretaceous shales; and, as in other regions, testimony is accumulating that the geological structure of the country is more decisive as to mineral impregnation than the age of the rock formation. The shattering of the older formations by the penetration of the newer volcanics has been a prime factor in the opening up of those underground



Marshall Basin and the Sheridan M. Mine, Colorado.

passageways, whether a series of irregular cavities or only a line of maximum porosity along which ascending mineral solutions have circulated and have deposited the metal in a manner determined by local conditions.

As yet the knowledge of the cause determining the presence of ore in one place and its absence in another is unsatisfactory and inexact, from the very



Rotary Snow Plow at Work at Ivanhoe, Colorado Midland Railway.

nature of the inquiry, but in the meanwhile the geologist has deciphered the rules of faulting and other disturbances of the rocks which interfere with mine exploitation, and is thus able to give the toiler underground an aid measurable in the one appreciable unit—dollars and cents. Be patient. Geology is but young, a child that takes by the hand the old industry of mining, leading his blind and faltering footsteps through the darkness of the under world. "Science moves but slowly, creeping on from point to point." Geology is destined to do greater things when those who direct mine exploration invoke its aid intelligently and with patience; when, from being a weird abracadabra of speech, it will prove a beneficent assistant to one of the most useful occupations of a busy humanity.

Telephoning With Telegraph Wires.

Long distance telephone lines are now used simultaneously for both telephoning and telegraphing without interruption or trouble to either system. To illustrate the value of the scheme, it may be said that a wire between two large cities, distant 1000 miles, is leased to a brokerage firm for telegraphing. The same circuit is used by the telephone company for connecting parties between the same cities who desire to converse by long distance 'phone. There is no interference with either the telegraph or telephone arrangement, although both may be in use at the same moment. Even an expert cannot tell when the line is doubled up.

For long distance telephoning two wires are always used, forming a metallic circuit. This is done to avoid the ground currents and ofttimes troublesome induction from electric light and trolley wires when the earth is used. The doubling up plan can be utilized on any metallic circuit at little expense by using a condenser formed by strips of tinfoil running parallel and close together without touching. The strips, which are enclosed in an oblong box about 2 feet long, are insulated with strips of paper placed between them. The condenser acts as a sort of electrical accumulator. After an electrical current has passed through the tinfoil strips they retain a certain amount of the electricity. The current thus induced is sufficient to transmit the human voice.

From each side of the telegraphic key, as used in connection with a telephone circuit, a wire is run to the condenser, which forms what may be termed a telephone bridge. While the key really opens and closes the main line circuit the voice of a person using the telephone travels by way of the bridge, or condenser, at periods when the line is open at the telegraph key. By means of the induced current and condenser the voice goes around the telegraph key, which is transmitting Morse signals by breaking and closing the circuit on the main line. Not enough current, however, will jump through the tinfoil strips in the condenser to affect the telegraph instruments on the line.

Colorado Dam Construction.

A dam is building at the entrance to South Platte gorge, forty-eight miles south of Denver, Colo., to form a reservoir with a capacity of 35,000,000,000 to 60,000,000,000 gallons of water. This reservoir will be in an irregularly shaped basin, at present cut into many patches by masses of red granite 100 to 500 feet in height. Its greatest width will be about one and one-quarter miles and it will extend seven miles up the Platte and three miles up Goose creek. The water will be 200 feet deep at the dam, 150 feet deep three miles away, and 50 feet deep six miles away. The dam will be 210 feet high and can be increased in the future to a height of 230 feet. It will measure about 25 feet from side to side at the base, and for some 50 feet upward will not exceed 50 feet in frontage. From this point it will increase in length until, at the top, it will measure about 500 feet. The face of the dam is to consist of a shield of steel standing at a slope of one-half to one. This is to be made of steel plates, each 5x10 feet and ⅜ inch thick and thoroughly coated with asphalt. These are to be riveted to steel beams embedded in the granite foundation, extending from the bottom to the top of the dam. Back of the steel plates is to be 2 feet of concrete and then 15 feet of granite blocks. Back of this will be granite boulders blasted directly from the sides of the gorge or dropped from low cars run out on a temporary bridge across the gorge. The width of the dam at the base is 240 feet. There will be three outlets for the surplus water when the reservoir is full. The first is a tunnel cut through the north buttress of the dam. This measures 6x7 feet on the upper half and 8x9 on the lower, and is ample for the normal flow of the stream. It is controlled by valves placed in a gallery at right angles to the tunnel. A second tunnel starts from the 110-foot level of the reservoir and pierces the granite buttress at an angle of 45°. This is 6x7 feet and is intended to be the main wasteway. The discharge of this tunnel will furnish water power to be utilized by an electric plant. In a depression between two masses of granite about 600 feet north of the dam is a large natural spillway, on the 200-foot level, which will be used in time of floods. The corporation owning this property is the South Platte Canal & Reservoir Co.

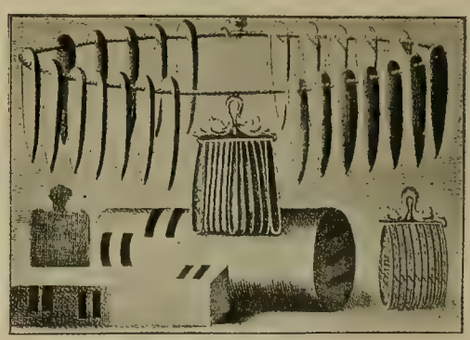
The Bodies We Live In.

During life each member of the body, in the act of living, produces poison to itself. When the poison accumulates faster than it can be eliminated, which always occurs unless the muscle has an interval of rest, then will come fatigue, which is another expression for toxic infection. If the muscle is given an interval of rest, so that the cell can give off its waste product to keep pace with the new productions, the muscle will then liberate energy for a long time. This latter condition is what we call endurance.

The power and endurance of the human machine are limited, according to our understanding of the above facts, and also our recognition of its slowness in getting started. Like any other intricate machine, the body requires time to get in harmonious working order. The brain, nerves, heart and skeletal muscles must be given some warning of the work they are expected collectively to perform. Ignorance of this fact has broken down many a man. The necessity of getting all the parts of the body slowly in working order is well understood by trainers and athletes, although it is doubtful if they could give any physiologic reason for the custom.

Ancient Goldsmith's Tools.

For the assayer of the present day the little sketch shown on this page, from Cassier's Magazine, has a peculiar interest. It was reproduced from the old volume of Pettus on "Metals," and represents a set of touch-needles and touch-stones of the kind used long years ago for determining the degree of fineness of any particular object of gold. The illustration



Ancient Goldsmith's Touch-Needles.

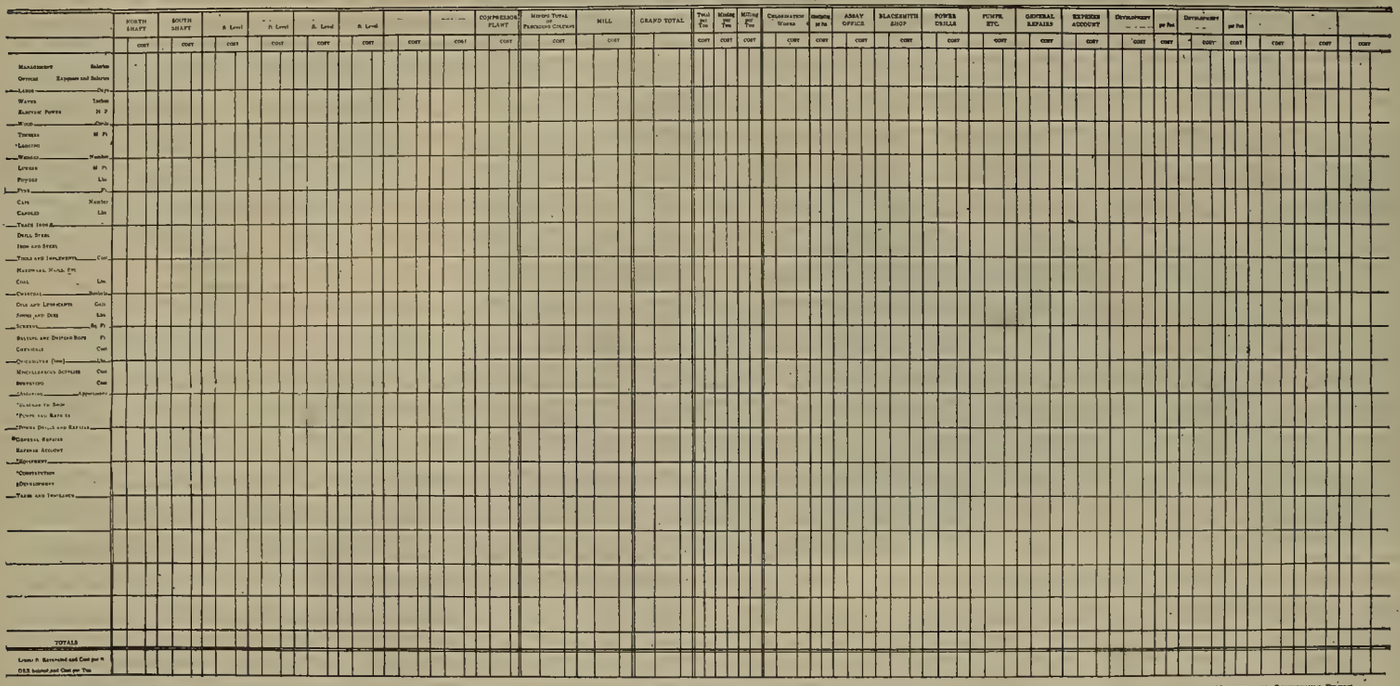
practically tells its own story. Each of the several needles represented a special and known degree of fineness, and a mark, made with it upon the touchstone, served as a standard for comparison with another mark made by the sample of gold to be tested. The approximation probably was close enough, and the outfit evidently served its purpose well.

The Diesel motor, which was the subject of a page illustrated article in the issue of Nov. 12, '98, was described by Col. E. D. Meier in a lecture delivered at the junior meeting of the American Society of Mechanical Engineers in New York City on the 2nd inst. In speaking of the work contemplated by the manufacturers of the engine he stated that, while originally constructed from German designs, it had been entirely remodeled and simplified to accord with American methods of conetruction. Two the motors, which will not be made smaller than 20 H. P., have been sold, one to a firm in Worcester and another to one in Jersey City. Two more are on the testing block and about ready for shipment.

A new terminology is agreed upon for the floor of the ocean, viz.: Caldron, a wide, deep depression; basin, deep depression, with sloping sides; furrow, a narrow depression; trough, a narrow depression, with steep sides; wall, a steep slope; floor, a gentle submarine slope; elevation, any inequality above the general level; bank, a relatively wide elevation; shoal, five fathoms; shelf, a horizontal bank.

GWIN MINE DEVELOPMENT COMPANY.

Itemized Report of the Superintendent for the Month of_____



PRODUCT:

CRUSHED ....Tons with ....Stamps in ....Days. ....Hours. SULPHURETS, less moisture ....Tons ....Lbs. NET VALUE IN S. F. OF SULPHURET BULLION ....$ NET YIELD IN S. F. OF SULPHURETS ....$ .... per Ton of Ore.

FED.... Lbs. .... ozs. Troy, of QUICKSILVER. AMALGAM, from Aprons and Sluices (Free Gold) .... Lbs. .... Ozs. " " " FREE GOLD .... $ .... " " "

Average Assay per Ton of SULPHURETS, $ .... " " Inside Plates .... Lbs. .... Ozs. .... $ .... " " "

" " " TAILINGS, $ .... " " Retort .... Lbs. .... Ozs. .... $ .... " " "

CHLORINATED ....Tons .... Lbs. .... Lbs. .... Ozs. TOTAL NET VALUE, $.... TOTAL NET YIELD, $.... per Ton of Ore

MINING AND SCIENTIFIC PRESS

Bookkeeping for Mines.

Written for the MINING AND SCIENTIFIC PRESS by S. I. HALLETT.

The need of employing an intelligent system of bookkeeping on mines is, unfortunately, far too much overlooked. To a mine manager, bookkeeping as a means of gaining information about what he is doing certainly comes next to assaying, while to the stockholders in a mine there can be nothing more appreciated than a clear, condensed report of each month's work, the yearly report merely being the sum of those issued every month, and thus giving a greater and better average than can be obtained by one month's work.

The annual reports of most mining companies differ each from the other, there being no regular system, and varying all the way from mere memoranda to a flood of figures that might be intelligible to an expert, but that, without long study and digging out of facts, convey but little meaning to the lay mind. How many reports of a mine's operations do we see, either quarterly or monthly, that cover pages of figures and from which it is impossible to glean whether the mine has made or lost money. Possibly at times this is intentional, but usually it is not. A short, clear, condensed statement, that can readily be seen through, is certainly of great benefit, while to the manager of a mine it is almost indispensable that he should know each month the cost of the separate workings, where the items came from, with their totals, the cost of running drifts or shafts per foot, the cost of getting out his ore by the ton and cost of pumping water or hoisting, and then, if he knows his business, he can readily tell if the men are doing the work as it should be done and as cheaply.

It will really, in place of adding to a manager's work when he gets such a system established, save him an immense amount of labor. It will also call his attention to many leaks and extravagances that do not show unless brought out in detail, when, of course, he will at once correct them.

The fact, too, of having these reports on each part of individual work on the mine acts as a stimulus to the men, especially if one or more crews are brought into competition.

There is no trouble about starting such a system. Any mine large enough to afford a timekeeper can readily do it. When the day's work is done, either one shift or two or three, a report by the shift boss handed to him with the supplies issued shows where all and each piece of work is done. Keeping these, at the end of each month he checks his payroll by it. Of course, there will be some mistakes, but not many, in which case he will simply have to force his balance.

The accompanying blank statement is that of the system used on the Smuggler, giving an idea of the system, which, simple as it is, took some time to elaborate. For example, by adding up the column marked "Mining" from top to bottom, you get the total of that branch of the cost, while by reading from left to right you get its individual cost on each piece of work.

A number of possible ledger accounts have been put down at the left that of course would be made suitable according to the work done on each mine. By adding this statement to your outside accounts, it will check the regular monthly cash statements.

Aspen, Colo., Dec. 29th, 1899.

In order to insure a complete and satisfactory system of mine bookkeeping, supplies from various departments, such as the warehouse, the timber, lumber and fuel yards, should be issued only by persons authorized to do so, and he should know where the supplies are to be used and make a memorandum thereof, and such supplies should only be issued upon orders made by those having authority to make them. The materials so issued will then be properly

WEEKLY REPORT OF THE GWIN MINE DEVELOPMENT COMPANY.

Report of the Superintendent for.....Days Ending..... .....at 7 a. m.....189....

DATE.	Ore Hoisted	Ore (Est'd) Milled.	Mill ..... Stamps.	Stoppages	Amalgam Outside Plates.		Quicksilver Fed.		Sulphurets Produced.	Average Assays Per Ton.			Men Employed.				
	Tons.	Tons.	Hours.	Cause of.	Lbs.	Ozs.	Lbs	Ozs.	Pounds.	Ore.	Sulphurets.	Tailings.	Mine	Top.	Mill.	Staff.	Total.
Saturday.....																	
Sunday.....																	
Monday.....																	
Tuesday.....																	
Wednesday....																	
Thursday.....																	
Friday.....																	
Totals.....																	
Previously reported.....																	
Monthly total..																	

WORK PERFORMED.

Ore Hoisted.		Waste Hoisted.		Drifted.				Crosscutted.				Sunk.				Raised.			
Tons.	Level.	Tons.	Level.	Feet.	Level	Course.	Total	Feet.	Level.	Course.	Total.	Feet.	Below Level.	Shaft, Winze.	Total.	Feet.	Above Level.	Upraise, Shaft, Stope, Etc.	Total.

REMARKS..... .....

.....*Superintendent.*

ASPEN, COLO.....189....

Report for the Month Ending.....of SMUGGLER MINING COMPANY.

	Mining.	Tramming.	Timbering.	Blacksmiths and Nippers.	Timekeeper and Top Men.	Superintendence.	Supplies.	Total.	Credits.	No. of Tons.	Per Ton.	No. of Feet.	Per Foot.
Shipping ore.....													
Mill ore.....													
Shaft.....													
Drift No. 1.....													
Drift No. 2.....													
Drift No. 3.....													
Old workings													
Mill expense.....													
Pumping													
Hoisting.....													
Office expense ...													
General expense.													
Litigation													
Totals													

Ounces Silver Produced.	Freight and Treatment.	Net Value of Ore Produced	Gross Value of Ore Produced.

REMARKS.

checked and appear each in its proper account.

The segregation of the various departments and branches of the business is an absolute necessity in mine bookkeeping. There is always a general expense account, which includes office expenses, insurance, taxes, engineering, etc. A construction account is essential, if buildings, tanks or other structures be erected, and a maintenance account will necessarily follow, which will include repairs to buildings, bridges, trestles, tracks, tanks, etc. The mining account is, of course, a most important factor, and it may be subdivided into such departments as may be desired. Shaft sinking should be kept apart from drifting, tunneling, etc., and stoping and deadwork are separate branches of this account. The mere statement of profit or loss in calculating mining operations does not convey to the owner the information he desires and should have, and the only way in which to obtain the detailed information is by the segregation of accounts. Timber account may be kept separate from mining, if desirable. Hoisting and pumping are also often kept separately. The depreciation of a plant is always in progress, and a certain percentage should be charged periodically, as in time the plant will have been worn out, or the depth of the mine may necessitate a new one.

Ore treatment should always be kept separately, and, as in mining work, the various details of this branch entered under its separate head.

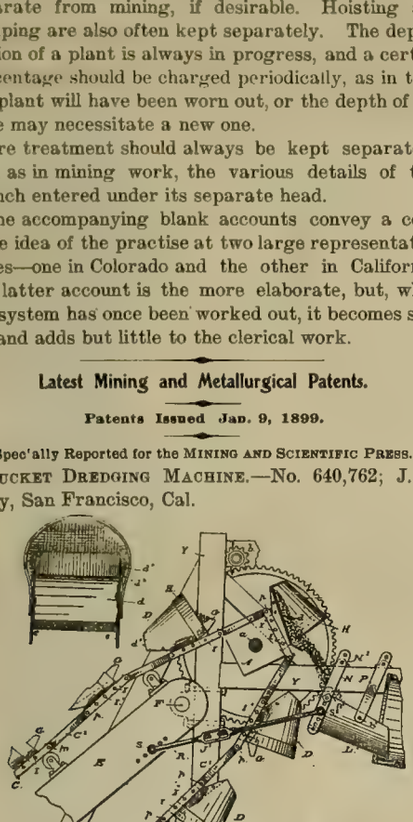
The accompanying blank accounts convey a complete idea of the practise at two large representative mines—one in Colorado and the other in California. The latter account is the more elaborate, but, when the system has once been worked out, it becomes simple and adds but little to the clerical work.

Latest Mining and Metallurgical Patents.

Patents Issued Jan. 9, 1899.

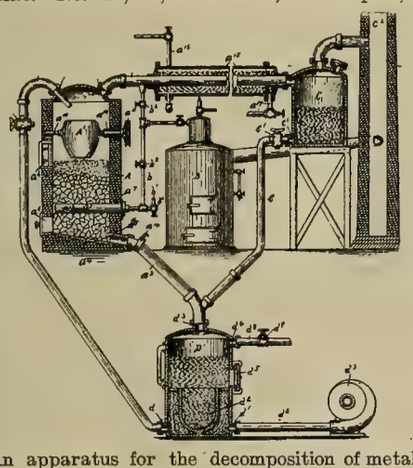
Spec'ally Reported for the MINING AND SCIENTIFIC PRESS.

BUCKET DREDGING MACHINE.—No. 640,762; J. H. Gray, San Francisco, Cal.



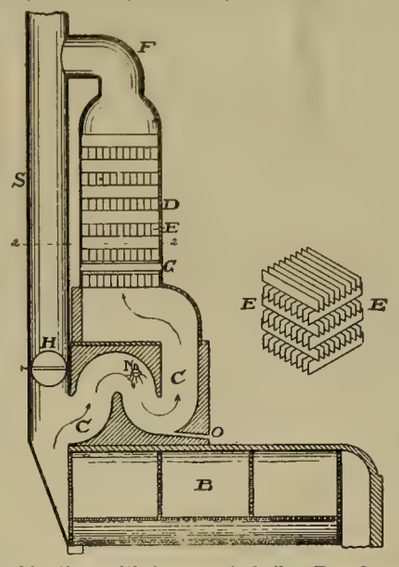
A dredging machine combination, a pivoted bucket carrying frame, adjustable in a vertical arc, a tumbler above pivot, and an endless chain of buckets; in a chute suspended from points of oscillation beneath mouths of buckets and with relation to the path in which they travel to receive the material from the buckets and means connecting chute with pivoted frame, consisting of the rods pivotally attached to chute and to frame, below their pivots, with means for adjusting the length of the rods.

PROCESS OF AND APPARATUS FOR MAKING CHLORIDE OF ZINC.—No. 640,908; H. K. Hess, Philadelphia, Pa.



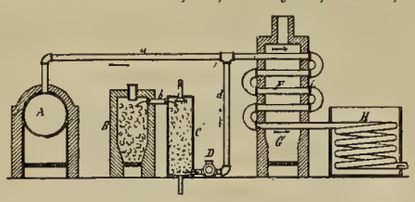
An apparatus for the decomposition of metalltic chloride in the manufacture of hydrogen gas, combination of furnace for decomposing metallic chloride and forming hydrochloric acid, an inlet conduit for supplying steam to interior of furnace for conducting the hydrochloric acid therefrom; steam conduit for discharging steam into the outlet conduit, means for cooling outlet conduit, receptacle for receiving acid from the outlet conduit, a second receptacle for receiving metal liberated in furnace and hydrochloric acid which unite to form a metallic chloride and generate hydrogen gas, and a conduit for conducting acid from the first receptacle to the second.

SMOKE PREVENTING DEVICE FOR FURNACES.—No. 640,796; W. Neuhs, Cleveland, Ohio.



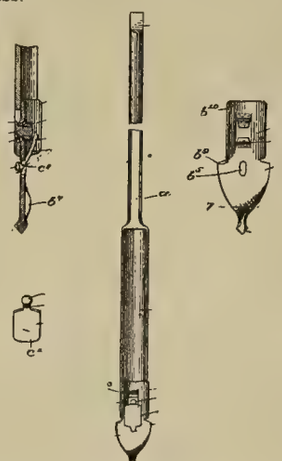
Combination with furnace A, boiler B and stack S provided with damper H, of the curved or S-shaped flue C, standing on or near the boiler, and in open communication with the stack, having outlet O, stack D having open cross tubes G, and cross strips E forming checkered open work within, the top of the stack D also in communication with the stack S; a water sprayer N in the flue C.

METHOD OF REFINING PETROLEUM AND PETROLEUM DERIVATIVES.—No. 640,918; A. Kayser, Buffalo, N. Y.



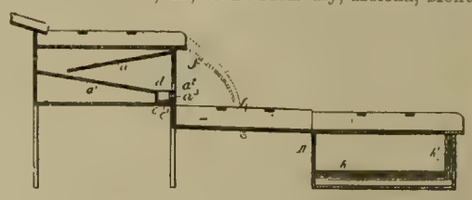
Method of refining ill-smelling or sulphur-bearing petroleum or petroleum derivatives, which consists in distilling same by application of heat to still, mixing carbon monoxide with oil vapor, and heating mixture of oil vapor and carbon monoxide to temperature necessary for causing carbon monoxide to react upon the objectionable compounds in the oil-vapor.

PROSPECTING DRILL. — No. 640,928; D. McCabe, Boston, Mass.



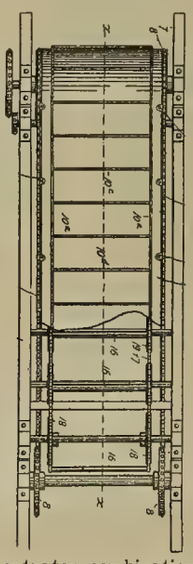
An earth drill having at its lower end a semicylindrical portion for retaining a sample of earth, a separable boring blade, comprising a shank curved to fit within semicylindrical portion, a boring portion below shank tapering to a drill point at its lower end, and having at its upper end a vertically elongated slot, and a lifter movably mounted in slot having a broad shovel-like lifting end, and a reduced neck having substantially parallel sides fitting within elongated slot and serving to maintain lifter in proper upright position while permitting it to swing up and down in the slot, and a retaining head at the outer end of neck and behind slot, with means for detachably securing boring blade to semicylindrical portion.

APPARATUS FOR TREATING PLACER ORES AND SANDS.—No. 650,929; J. P. McEvilly, Helena, Mont.



An apparatus for collecting float gold, consisting of a runway of relatively fixed initial and terminal casings or closures arranged at different levels, each having a top screen of different-sized perforations, the fixed perforated top of the terminal casing connected with the inclined imperforate bottom of the initial casing by an intervening sluice, a mercury-containing tank transversely in the initial casing at the junction of the latter with sluice, a mercury-containing tank arranged in the terminal casing at right angles to the initial tank and having a transversely concaved bottom, the initial inclined bottom terminating in a screen for the initial tank, an opening in the casing wall at screen, an overflow opening in the tank and an opening in the casing registering with tank overflow opening, the openings discharging into the sluice, an overflow opening at the outer end of the concave tank and riffles having their lower edges on a level with the bottom of the overflow opening, their upper edges having a graduated relation to the top of overflow opening.

ORE CONCENTRATOR.—No. 641,248; A. Ten Winkel, Denver, Colo.



In an ore-concentrator combination with suitable frame provided with sprocket wheels at both extremities and chains engaging wheels, of an endless apron impervious to water, attached to chains at suitable intervals and left sufficiently slack to form pockets, transverse riffles attached to apron, each pocket having a riffle at each extremity and one or more intermediate riffles, the mechanism being so arranged that the mineral is carried upward with the apron and the gangue downward by the flow of the water.

Popular and Reliable.

THE MINING AND SCIENTIFIC PRESS has begun its eightieth half-yearly volume, and in honor thereof, possibly, is printed from beautifully clear new type produced by a Mergenthaler, we judge. The PRESS is Western mining authority, and it is doubtful if it has a superior in the world as a popular and reliable journal in in its line. Many more years to it.—Inyo, Cal., Register, Jan. 11.

A Colorado Opinion.

THE MINING AND SCIENTIFIC PRESS, of San Francisco, is the very best mining publication printed, and has a circulation that covers the civilized world. —Telluride, Colo., Journal, Jan. 13.

THE London Daily Mail's Cape Town correspondent says that the experiments with the Marconi system of wireless telegraphy between DeAar and Modder river have met with small success, the iron in the hills beyond Enslin playing all sorts of pranks with the system.

Cyaniding in New Zealand.*

NUMBER II.—CONCLUDED.

Written By JAMES PARK, Thames, Auckland, N. Z.

WET CRUSHING.—For ores containing a large proportion of free, easily amalgamable gold, with a certain proportion of fine or "float" gold and silver sulphide, the mill practice is:

(a) Crushing with water.
(b) Plate amalgamation.
(c) Spitzlutte separation of sands and slimes.
(d) Cyanide treatment of sands and slimes by ordinary percolation.

A typical example of an ore of this class is that of the Kauri Gold Estates at Opitonui, where a new 40-stamp mill has just started. The sands and heavy slimes are subjected to the "double" cyanide treatment; but it is doubtful if the additional saving will pay for the extra labor involved. So far, no provision has been made for the treatment of the fine slimes. If they are worth it, they will probably be treated by agitation and decanting.

For a clean ore, almost identical with that described above, but containing a small proportion of free amalgamable gold, and a large proportion of fine cyaniding gold, with little or no slimes, the method of treatment at the Crown mines is:

(a) Crushing with cyanide solution.
(b) Direct cyanide treatment of mixed sands and slimes by percolation.
(c) Plate amalgamation of gold.

With an ore so exceptionally free from slimes, it seems that the order of treatment could be reversed with advantage, as regards both stamp duty and efficiency of amalgamation on the plates.

The Crown Mines Co. was the first (in 1897) to adopt wet crushing for these gold and silver bearing chalcedonic ores.

The ore is hard and splintery, clear and free from all impurities, and, unlike most of the ore from the neighboring mines, contains little or no silver, except what is alloyed with the gold. It is crushed in the company's 60-stamp mill with cyanide solution in the mortars, about $2\frac{5}{10}$ tons of solution being used to one ton of ore. A 25-mesh screen is used, and the duty per stamp is about two tons per day. The slimes formed in crushing are said to amount to less than 5%. The monthly output is about 2750 tons. In the month of June last, 2900 tons were crushed, yielding 3037 ozs. 5 dwt. of bullion, valued at £6069 14s 8d, equal to a fraction under £2 per ounce.

The cyanide plant consists of twenty-eight leaching vats, each $22\frac{5}{10}$ feet in diameter and 4 feet deep. Much reticence is maintained as to the exact treatment; but the main features are understood to be as follows:

The whole of the pulp from the sixty stamps is conducted by a launder to one vat, and allowed to discharge into the center until the vat is about half full. The pulp is then diverted to another vat, which is allowed to fill in the same manner. The mixed sands and slimes in the first vat are allowed to settle for an hour or two, after which the fairly clean top solution is syphoned off into a collecting tank, whence it is pumped up to two elevated tanks, from which the solution for the stamps is supplied. The pulp is again diverted into the first vat until the charge is complete. After settlement, the clear top solution is again drawn off. In this way three or four vats may be in course of filling at the same time.

The settlement of the slimes is effected without the aid of lime by allowing the solution to percolate from the bottom of the vat during the filling and periods of settlement. The downward currents promoted by the draining from below are said to promote the settlement of even the finest material within a reasonable time. This is a point to be noted by cyaniders troubled with slimy products.

The mixed sands and slimes are treated by percolation in the ordinary way. The depth of each charge is about 30 inches and the weight forty tons. The strong cyanide solution is allowed to percolate from thirty to forty hours, while the week cyanide and water washes are drawn off by the aid of an air pump.

The syphon used in the sand vats consists of $2\frac{5}{10}$-inch rubber hose, to one end of which is attached a short length of wooden batten, to keep it on the surface of the solution. The other end is fixed, inside the vat, to a short iron pipe passing through the side, about 18 inches above the filter cloth.

In the extractor room there are five precipitation boxes of the ordinary pattern, divided into compartments by baffleboards; and four zinc towers, consisting of wooden boxes about 6 feet high and 30 inches square, set on end and connected in a series, like charcoal towers. The solutions flow upwards through the zinc turnings, the overflow being conducted in a pipe to the bottom of the next tower, and so on to the last.

The sands are sluiced out of the vats over a wide expanse of amalgamated copper plates, which catch a certain proportion of the free gold.

The actual recovery from all sources is said to vary from 84% to 87%; but the figures of cost are not obtainable.

For ores containing some easily amalgamable gold and fine gold, associated with pyrites and silver sulphides, the treatment used is:

(a) Crushing with water.
(b) Plate amalgamation.
(c) Spitzlutte separation of fine slimes, if necessary.
(d) Vanner concentration of sulphurets.
(e) Cyanide treatment of sands by percolation.
(f) Cyanide treatment of slimes by agitation and decanting.
(g) Cyanide treatment of concentrates by agitation.

The practise at the Woodstock mill is a typical example of this system, the details being as follows:

The ore is chalcedonic and finely crystalline quartz, containing a small proportion of clayey matter and a little pyrites. It is stained a greyish and blackish brown color through the presence of iron and manganese oxides.

At the company's 40-stamp mill, the monthly output is about 1100 tons, the stamp duty being slightly under two tons of 2240 pounds per day. The value of the bullion varies from 8s to 12s per ounce, being principally composed of silver.

The ore is crushed with water and passed over amalgamated copper plates, from the end of which the pulp is raised by a wheel elevator to a Spitzlutte. The slimes from the Spitzlutte are conducted to a slime tank, while the sands, carrying some slimes, are passed over vanners, which collect about 1% of rich concentrates.

The vanner tailings, composed principally of sands and heavy slimes, are led to the leaching vats, which are provided with automatic distributors. The construction of the distributors is of the simplest character, being similar to that of those formerly used at Waihi. They consist of a central wooden box, pivoted on a wooden pillar fixed in the center of the vat, and from which extend seven light, narrow wooden launders, or arms, of different lengths, so as to effect an even distribution of the pulp. At the end of each arm is fixed a piece of sheet zinc to divert the stream to one side.

The whole of the pulp from the vanner ends is collected in one stream and diverted into one vat at a time, until the charge is filled. During the filling, the overflow carries the lighter slimes into the slime vats.

The sands and heavy slimes are treated with cyanide by ordinary percolation.

The slimes from the Spitzlutte and those from the sand vats are agitated with cyanide in vats provided with slowly revolving arms. When the gold is dissolved, lime is addded, and the slimes are allowed to settle; after which the clear solution is decanted off. The slimes are washed by agitating with successive portions of water, and decanting.

The concentrates have a value of £30 to £40 per ton, a large proportion of the value being in silver sulphide. They are treated by agitation with a 4% solution of cyanide for thirty-six hours. Two pounds of lime are added to every ton of concentrates. The charge weighs about 1.5 tons. Frank Rich, the superintendent, who adopted the present treatment, informed the author that the recovery varied from 90% to 94%, at a cost of 18s per ton for labor and material.

The recovery by cyanide from all sources is said to vary from 82% to 86%, at a cost of 4s 9d per ton of ore milled.

For very slimy ores, containing very little easily amalgamable gold, and a large proportion of extremely fine gold, besides the usual silver sulphides, the treatment is as follows:

(a) Crushing with cyanide solution.
(b) Spitzlutte separation of sands and slimes.
(c) Treatment of sands by percolation.
(d) Treatment of slimes by agitating and decanting.

This method of treatment is subject to various modifications, as regards mechanical appliances and methods of application; but the general principles are the same everywhere.

The procedure at the Waitekauri 40-stamp mill is as follows:

The ore, which contains a good deal of oxidized products, is crushed with cyanide solution in the mortars. From the screens the pulp is conducted direct to the sand vats, into which it is distributed by means of revolving wooden box launders, actuated from a secondary shaft. The slimes, amounting to about 33%, are allowed to drain into the collecting vat, flowing through a pipe fixed into the inside of the vat. This pipe has a movable joint, and is raised by a screw as the pulp accumulates in the vat.

The collecting vat is provided with revolving arms, which keep the fine slimy pulp from settling. From this vat the slimes are pumped into the slime leaching vats, which are provided with a double set of slowly revolving arms, the lower ones having rakes on them, and the upper ones, loose pieces of sacking which drag through the pulp. In these vats the slimes are treated by agitation and decanting, lime being added with each wash to facilitate settlement.

The sands are treated by ordinary percolation with first a 0.5% solution of cyanide, and then with the weak solution and water washes.

There are twelve sand vats, fourteen slime vats and two slime collecting vats, each 22.5 feet in diameter and 4 feet deep. The monthly output of the forty stamps is about 2200 tons of 2240 pounds. The actual recovery is said to be 90%, at a cost 5s 6d per ton.

The exceptionally large proportion of slimes in this ore rendered the adoption of wet crushing a knotty problem. The increased output, higher extraction and lower costs are proofs enough of the success of the change from dry crushing, which was effected under the supervision of G. Davey, the superintendent, without hitch, or decrease in the monthly output.

CONCLUDING REMARKS.—Among the points most likely to attract notice are the low stamp duty and heavy consumption of cyanide.

The low stamp duty of the Ohinemuri mills has often been a subject of discussion; but, to my mind, no satisfactory explanation has been advanced. I am of the opinion that it is due to the circumstance that the mills having been designed and erected in the first place for dry crushing, the mortars are too narrow and restricted to give good results by wet crushing. Until they have been replaced by new mortars specially designed for wet crushing, it seems hopeless to look for better results. The advantages of a stamp duty of four or five tons per day instead of two tons are too obvious to require specification.

Silver in all its forms requires a stronger solution of cyanide to effect its solution than gold; and on these gold fields the large consumption of cyanide is due to the presence of silver sulphide (principally Ag_2S) generally in amounts worth saving, and to the circumstance that the free gold is alloyed with about one-third its weight of silver.

According to Elsner's equation for the solution of gold by potassium cyanide, 4 pounds of cyanide should dissolve 100 ounces of gold; but in practise it is found that the operation takes nearly forty times that quantity. To dissolve 100 ounces of silver would require 7.5 pounds of cyanide according to the equation:

$$4Ag+8KCy+G_2+2H_2O=4(AgKCy_2)+4KHO.$$

From the solution of 100 ounces of silver existing as the subsulphide (Ag_2S), 7.01 pounds of cyanide would be required by the following equation:

$$Ag_2S+4KCy=2(AgKCy_2)+K_2S.$$

The potassium sulphide resulting from the dissolution of silver sulphide also tends to cause a loss of cyanide. It has been shown by Crosse and others that a trace of alkaline sulphide in cyanide solutions does not act injuriously; but the large quantity of K_2S liberated in the treatment of the silver-bearing ores of the Hauraki gold fields must cause the precipitation of a portion of the dissolved gold in the vats. Much of this precipitated gold is doubtless redissolved by the excess of free cyanide present in the solutions; but it always requires this excess to obtain adequate extractions, thus necessitating the use of comparatively strong solutions.

The cyanide process was first introduced in 1899 at the Crown mines at Karangahake, a property owned by a Glasgow company which had entered into a contract with the patentees, Messrs. MacArthur and Forrest, to treat the ore. This was the first actual application of the process at the mine. For two or three years the work carried on was largely of an experimental character, and until 1894 the results were unimportant.

For the year ending March 31st last, 45.31% of the gold and silver raised in New Zealand, amounting to the value of £489,767, was produced by the cyanide process.

At the majority of mines cyanide treatment was adopted by the owners at the author's recommendation, but only after he had made a careful investigation of the constituents of the ore, and repeated trials on a working scale at the Government experimental works at the Thames. In other cases, the necessary experimental trials were made by the author's assistants at the mine. In no case was the process adopted until success had been assured, a precaution which doubtless has been a potent factor in promoting the popularity of cyanide treatment in this country.

The ores of Te Aroha and Monowai are generally very refractory, containing free-milling gold, mostly very fine, associated with sulphides of silver, iron, copper, zinc and often mercury. Many attempts have been made to treat them by cyanide, but without success, and, so far as our present knowledge goes, it is doubtful if they can ever be treated successfully in the raw state by that process.

For the treatment of cupiferous ores and concentrates from the Jubilee, Sylvia and Monowai mines, which could not be treated successfully by ordinary cyaniding, the author obtained good results by first subjecting the ores to a chloridizing roast, and then leaching out the copper chlorides with water. After an alkaline and water wash the gold and silver contents were extracted by cyanide by percolation. During the roasting the silver sulphides present were chloridized to the chloride which is easily dissolved by cyanide.

From a large parcel of Monowai ore, 92% of the gold and 85% of the silver were extracted, the com-

* Condensed from Transactions of American Institute of Mining Engineers.

position of the ore being determined by F. B. Allen, as follows:

	Per cent.
Insoluble gangue	90.15
Copper pyrites	3.78
Iron pyrites	4.40
Galena	0.25
Zinc-blende	0.26
Alumina	0.13
Water and loss	1.03
	100.00

The bullion contents of this ore were gold 1 ounce 5 dwts. and silver 14 ounces per ton.

One of the most perplexing features connected with the treatment of these ores is the constantly varying proportion of silver, which necessitates the use of solutions of varying strength to obtain adequate extractions, thus adding another source of anxiety to the many worries which the use of cyanide entails on the successful cyanider.

[The low stamp duty of the mills above referred to may be due to a tendency of the dense chalcedonic quartz to break into splintering fragments instead of grains. A narrow mortar would facilitate rather than retard discharge.—ED.]

Community Telephone Exchanges.

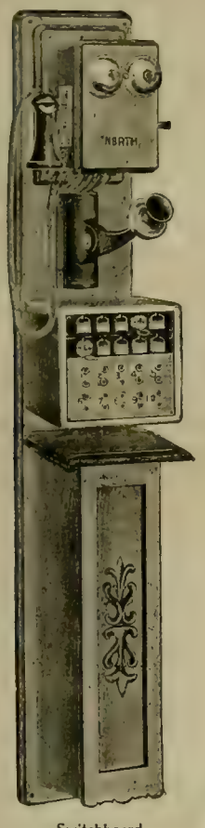
When the telephone was invented few people thought that the time would ever come when this necessity of modern civilization would be put within reach of all. Such, however, is now the case, the independent telephone companies having accomplished this desirable end. They formerly put the benefit of this convenience within the reach of the great middle class in towns and cities; now they have gone one better and are commencing to furnish service to small and scattered communities. Telephony can never reach its place in civilization until outlying residents are able to come into immediate verbal intercourse.

The North Electric Company, of Cleveland, Ohio, has recently brought out what it calls a "community exchange," by the use of which the city exchange is enabled to furnish a service at a price that is profitable to the exchange and, at the same time, within the reach of patrons in the country.

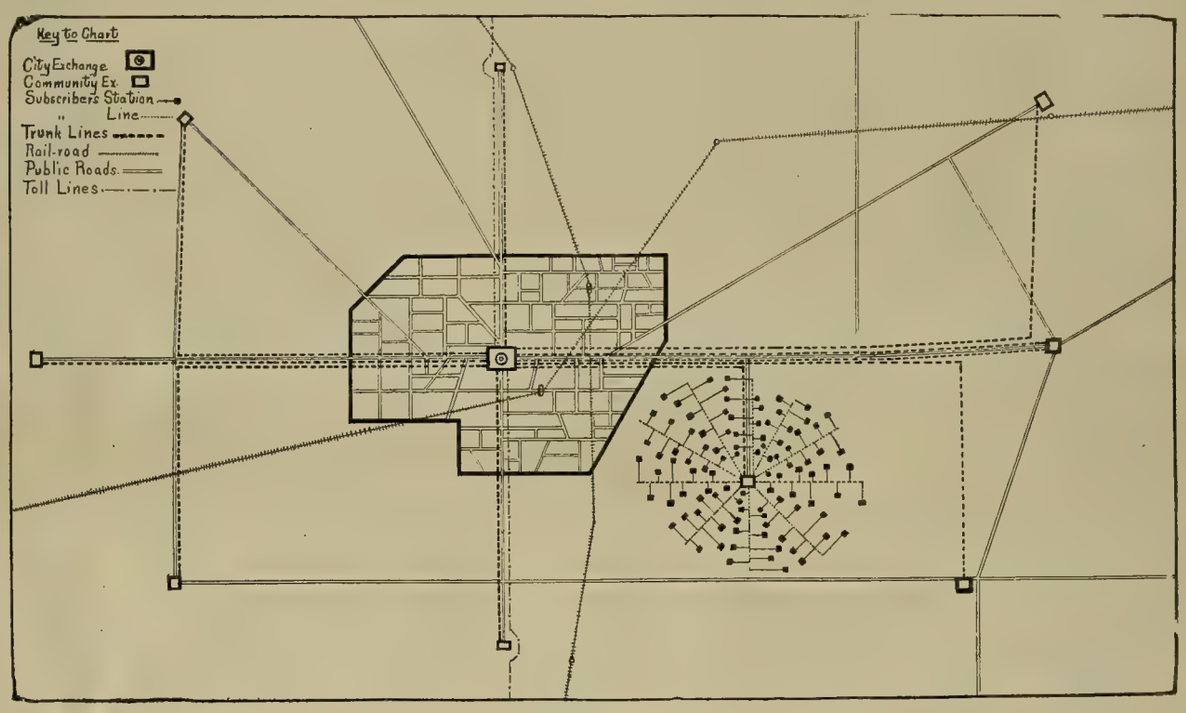
In the accompanying chart is shown a method which the North Company advocates, in placing community exchanges in the territory surrounding a city. At various points are located one of the switchboards illustrated herewith. From this central point radiate eight or ten lines, to each of which are connected several subscribers, preferably not over ten. This community exchange is connected by a trunk line to the city exchange, as are also the trunk lines from the several other community exchanges. Patrons are enabled to converse with any of the other subscribers to their own exchange, or, by trunking into the city exchange and from there to any of the other community exchanges, are enabled to reach any of the patrons of the city or other community exchanges. The subscriber can likewise connect to any of the toll lines that may run into the city exchange.

Each telephone is of the long-distance type, and one is enabled to talk to any point that the toll service reaches. The switchboard used at the community exchange is very simple and efficient and, it is stated, practically impossible to get out of order. A number of telephone exchanges have adopted this service with profit, and are now paying dividends where they formerly cleared but little money.

It will be noticed in the chart that the lines from the community exchange to the subscribers' stations are shown in connection with only one community exchange. If the reader will imagine the lines radiating from the other community exchanges shown, he will see that the territory is completely covered, and the patronage of the average exchange would often be more than doubled.



Switchboard.



Illustrating Method of Placing Community Exchanges.

Fineness and Value of California Gold.

The following is written by Frank A. Leach, Superintendent of the Mint at San Francisco, on the fineness of California gold and is from "California Mines and Minerals," the handsome and valuable book issued as a souvenir of the visit of the American Institute of Mining Engineers to San Francisco last September.

The following table is compiled from the average of fineness of deposits made from the various mining counties of the State, covering a period of several months, embracing both quartz and placer gold:

	Fineness.	Value.
Nevada	855	$17 67
Siskiyou	852	17 61
Kern	754	15 58
El Dorado	868	17 94
Placer	792	16 37
Tuolumne	804	16 62
San Diego	803	16 59
Shasta	845	17 46
San Bernardino	705	14 57
Inyo	770	15 91
Plumas	851	17 59
Calaveras	835	17 26
Tehama	882	18 33
Amador	836	17 28
Sierra	858	17 73
Mariposa	805	16 64
Trinity	850	17 57
Yuba	881	18 21
Los Angeles	889	16 81
Humboldt	688	14 22
Stanislaus	895	18 50
Butte	878	18 14
Fresno	805	16 64
Sacramento	898	18 56
Lassen	890	18 39
Mono	550	11 36
Merced	813	16 80
Madera	847	17 50

The above table credits Sacramento and Stanislaus counties with producing gold of the highest fineness. The majority of deposits from these counties, in fact, over four-fifths of the gold brought to the Mint from these locations, runs over 900 fine. This gold is almost entirely from placer sources. It is but fair to say that the average for Mono county was derived from a small number of deposits, and that an average covering a longer period might raise the fineness quoted.

The highest grade of gold received at the Mint for several years was from San Bernardino county, in a deposit of placer gold. It returned a fineness of 980, or a value of $20.25 per ounce. Tuolumne county has the record of yielding even a higher grade of precious metal than this from San Bernardino. It came from a quartz mine, now said to be idle, which produced gold almost pure, running at times over 990. It is worthy of note that, while the mines in the same locality usually have about the same average fineness of gold, there is sometimes a great variation; and often in one mine the gold will vary in value to the extent of a dollar an ounce in some cases. There were thirty-one counties which produced gold in California in 1898. In the first table in this article twenty-eight counties are named. Making an average of the fineness and value of gold from the counties named in the table, it is seen that the average fineness of California gold is 817.8 and the average value about $16.90 per ounce. The highest average county is Sacramento, where the gold averages 898, or $18.56 per ounce. Mono has the lowest average gold, 550 fine, or $11.36 per ounce.

The finest grade of gold produced in California, and probably in the world, is from the San Guiseppe mine, half a mile from Sonora, Tuolumne county. It is a quartz mine, but the gold has uniformly run from 982, or $20.29, to 987, or $20.40, per ounce. Some years ago the gold from a run of ninety tons of ore went 998, or $20.6305 per ounce. When it is remembered that perfectly fine gold is valued at $20.67 it will be seen how very pure this San Guiseppe gold is. No mine in the world has such a record, the only approach to it being the Mount Morgan, in Queensland. The Neal mine, near the San Guiseppe, has gold running 950½, or $19.65 per ounce, and it is also a quartz mine. The Table Mountain and Bald Mountain placers, of Tuolumne county have yielded gold running 950, or $19.63 per ounce. The Spanish Hill placer, of El Dorado county, has yielded gold 987 fine, or $20.40 per ounce. Some of the gold from the placers of Newhall, Los Angeles county, is worth $19.75, or 955½ fine. Placer gold is usually of higher grade than that from quartz. The highest average of fineness in California is that of the gold from the placers around Folsom, Sacramento county, where it is worth over $20 per ounce, running from 974, or $20.13, to 978, or $20.21, per ounce. The average fineness of gold from that county last year was 898, or $18.56 per ounce, the highest in the State. Gold of the lowest grade in the State comes from Mono county, where, at Bodie, it seldom goes over 580½, or $12 per ounce, and down to 411½, or $8.50 per ounce. The gold from the largest producing quartz mine at Bodie, in large quantity, averaged last year 484 fine, or $10 per ounce. Gold from some of the cyanide tailings plant in that camp ran only 130.5 fine, or $2.69 per ounce. At Benton, in the same county, the gold runs up to 919½, or $19 per ounce, but elsewhere it is of low grade. Average for the county is 550 fine, or $11.36 per ounce. There is so much variation in localities that a county average does not tell the exact story. For example, in Calaveras county gold for some mines at Angels runs 975, or $20.15 per ounce, and from Vallecito 987, or $20.42 (Fine Gold mine); while one mine at Hodson yields gold of 627 fineness, or $12.96 an ounce. There

is a mine in Inyo county yielding gold worth $20 per ounce, or 967½ fine, and one in Kern county with same grade of gold. The largest producer in the latter county has gold worth $16 per ounce, or 774 fine. A placer mine in Johnsville, Plumas county, also has gold worth $20.36, or 985 fine.

The following table of value of gold per ounce from Calaveras county mines was compiled from returns sent in to the Statistician of the Mint, for 1898. Q means quartz mine; H, hydraulic; P, placer; D, drift. Only a few of the mines of the county are named:

	Mine and Location.	Fineness.	Value.
Q	Demarest, Angels	798½	$16 50
Q	San Justo (Gates) Angels	960–975	19 84-20 15
Q	Hog Pen, Angels	880	18 19
Q	Lightner, Angels	885½	18 30
Q	Midland, Angels	830	17 57
Q	Gwin, Gwinnine	802	16 57
Q	Royal Cons., Hodson	627	12 96
P	California, Milton	863	18 25
Q	Easy Bird, Mok. Hill	871	18 00
H	Green Mount., Mok. Hill	919½	19 00
H	J. Cuneo, Mt. Ranch	897½	18 55
Q	Legal Tender, Murphys	880	18 19
Q	Hinsdorf, Murphys	756	15 62
D	Hedrick, San Andreas	871	18 00
H	Fine Gold, Vallecito	940–897	19 43-20 40
Q	Keltz, West Point	750	15 50
Q	Oakland, West Point	714	14 75

It will be noted that the value of gold per ounce produced in Calaveras county ranges from $20.40, which comes from Vallecito, to $12.96, which comes from the Royal Con., at Hodson. Silver, copper and lead are the metals most frequently intermixed with gold and tend to reduce its value.

Industrial Notes.

—All the Great Northern Railway employes talk strike.

—About 400 men are at work on the Everett, Wash., tunnel.

—The Seattle, Washington, manufacturers organized last week.

—A hundred bills before Congress propose to obliterate "the trusts."

—The employer's dollar grows smaller and the employe's dollar larger.

—Seattle, Wash., wants $1,000,000 Congressional appropriation for a government building.

—The War Department will send 400 soldiers to Alaska early next spring for service in the Cape Nome district.

—Prospectors for oil at Arroyo Grande, Cal., recently struck a flow of natural gas, which, when lighted, blazed up to a height of 12 feet.

—Near San Luis Obispo, Cal., along the line of the Southern Pacific coast line, about 2000 workmen are engaged in railroad work.

—Western newspapers are asked to unite in an effort to have Congress smash the paper trust by putting wood pulp and printing paper on the free list.

—Prince Poniatowski has bought the San Mateo, Cal., electric light plant and will operate it until the power transmission line from the Blue Lakes is completed.

—The assessed valuation of property in Oregon for 1899 is $120,287,879. This is the lowest total since 1890. The decrease since 1893, the year of highest valuations, has been $47,801,026.

—C. A. Canfield will build a machine shop, to cost $20,000, in Bakersfield, Cal., to make and repair well-boring tools, the plant to include a 45-foot lathe that will turn out the stems used.

—The Yuba, Cal., Electric Power Co. will build a transforming station at Lincoln to reduce the voltage through the main line from Colgate to Sacramento, from 24,000 to 2000 volts, for the proper use of incandescent lights.

—At Denver, Colo., the foundry and machine shops of the F. M. Davis Iron Works Co. were totally destroyed by fire on the 10th inst., loss $130,000, fully insured. Mr. F. M. Davis says they will immediately rebuild.

—Manufacturers in the United States, whose attention has been called to Mexico as a country where manufacturing can be conducted economically, with a view of supplying the population there with their products, have arranged with a Mexican company for the establishment of power houses, with 7500 H. P. at the Rio Blanco, in the State of Vera Cruz.

—At Springfield, Ohio, electric workers have gained an increase of wages from $2.50 and $2.75 per day to $3 per day, and the coal handlers from $9 per week to $10 for single and $11 for double teams per week.

—The hammer of the axle forge installed in the Santa Fe shops at San Bernardino, Cal., has a face of 11x22 inches, a 42-inch stroke, weighs 4200 pounds, and can strike a blow with a force exceeding 100 tons.

—The Senate Committee on Interoceanic Canals has agreed unanimously to report a bill for the construction of the Nicaraguan canal. The bill is the same as that reported favorably in the House by the Committee on Interstate and Foreign Commerce, with a few verbal amendments.

—The value of the manufactured goods produced in Denver, Colo., during '99 exclusive of smelter products, was $34,634,342. The factories employ 12,955 persons, whose earnings were $7,935,750. During '89 the Denver factories produced goods valued at $29,268,250, and employed 11,576 persons, who earned $7,110,450 in wages. In addition the smelters employ 1800 men, whose earnings during the year were $960,000.

—According to the last census the wealth of the United States in 1890 was $65,037,091,197, of which real estate and improvements figured at $39,544,544,333; mines and quarries, $1,291,291,579; gold and silver, 1,158,774,948; mills, machinery and stock on hand, $3,058,593,441; railroads, streets and steam, $8,685,407,323; telegraph, telephone, shipping and canals, $701,755,712; miscellaneous, personal estate, etc., $7,893,701,821. The increase of wealth from 1880 to 1890 was 49%. A proportionate increase from 1890 to 1900 would make the wealth of the United States today about $100,000,000,000. At the same rate of increase the wealth of the United States in 1950 should be about $608,475,000,000.

—The United States has 184,532 miles of railroad, Germany 29,984. France 25,862, European Russia 25,357, Great Britain 23,534, British India 21,543. The United States has 36,746 locomotives, Great Britain 19,602, Germany 16,842, France 10,502, Russia 8748, British India 4258. Great Britain has more locomotives per mile than any other country, owing to the congestion of her population. She also has more passenger cars, for the same reason, because her coaches have from 30% to 50% less capacity than those of the United States. Her passenger cars number 62,592, while those of Germany number 34,250, and those of the United States 33,893. As for passengers, Great Britain's yearly record is 1,062,911,000, while that of the United States is 698,342,000, Germany's 646,431,000, France's 382,240,000, British India 160,000,000, Russia 97,000,000. The average journey in the United States is much longer than that of the European countries, notably than that of Great Britain, where the large number of passengers is due greatly to the enormous suburban service in and about London. In freight here are the best yearly records: United States, 913,000,000 tons; Great Britain, 437,000,000; Germany, 276,000,000; France, 120,000,000; Russia, 97,000,000; British India, 39,000,000.

Personal.

LOUIS JANIN is in Butte, Montana.

B. S. REVETT, of Breckenridge, Colo., is in Boston.

C. S. CORNING says that a smelter will be built at The Needles, Cal.

PERCY WILLIAMS is now assayer at the Geyser mine, Mercur, Utah.

A. H. BUCK of Denver is now engineer of the Mapini mine, Durango, Mex.

VICTOR M. CLEMENT goes to London, there to make his permanent residence.

C. H. MALLETT has been re-elected Supt. Brunswick Con. M. Co., Nevada Co., Cal.

ASSAYER KRELIUS has resigned his position with Luckhardt & Co., San Francisco.

S. I. HALLETT has returned to Aspen, Colo., from a trip through Idaho, Nevada and Utah.

S. E. HOGE, of Los Angeles, Cal., is superintending his copper properties at Ogc, Colo.

F. W. KROGH, Pres. Krogh Mfg. Co. of San Francisco, has returned from Mariposa Co., Cal.

A. C. LUCK, Mgr. Austin M. Co., Austin, Nev., is examining mines in Grass Valley district, Cal.

W. H. NUTTING is at Bingham, Utah, superintending the erection of a smelter for the Bingham Gold & Copper Smelting Co.

ARTHUR W. CORRY, Supt. A. & N. E. C. M. Co., Kingman, Arizona, is visiting Butte, Montana.

F. B. HOWER, of Buffalo, N. Y., is in Victor, Colo., figuring on building a mill in Colorado City.

M. M. BARUH has assumed charge of the sulphur mine at Humboldt, Nevada. J. B. Miller is foreman.

WM. LEWIS WEBB has recently been appointed assayer for the Keystone Con. mine, Amador City, Cal.

J. B. CORBUS, Supt. Alaska-Treadwell mine, Douglas Island, Alaska, will remain in San Francisco till March 20.

A. C. GARDE has been appointed mechanical engineer of the War Eagle and Centre Star, B. C., Companies.

W. PELLEW HARVEY, of Vancouver and Victoria, B. C., is in London, and returns to British Columbia next April.

H. L. SHIPPY, Sec. John A. Roebling's Sons Co., has returned to New York City after an extended trip through Europe.

O. O. HOWARD, JR., Pres. Ratcliff Con. G. Mines, Ltd., operating in Inyo county, Cal., has returned from New York City.

G. F. WASSON is on the Colorado Springs, Colo., Board of Brokers' Association as caller, at a salary of $4500 a year.

THE Board of Regents Nevada State University has accepted the resignation of R. D. Jackson, who occupied the chair of mines.

A. PAYNTON has been appointed Commissioner of Crown Lands and Minister for Mines in the new South Australian ministry.

R. H. POSTLETHWAITE, of Oroville, Cal., dredging fame, has gone to British Columbia to report on a Fraser river mining property.

DR. STEPHEN BOWERS, California State Mine Examiner, preached an eloquent sermon in a Randsburg, Cal., pulpit on the 14th inst.

E. H. BENJAMIN, Sec. California State Mining Association, now on a business trip to southwestern Alaska, expects to return to San Francisco about Feb. 1st.

HENRY SHEEHY of Nevada is in San Francisco, en route to Bolivia, South America, there to take charge of a mining property for an English syndicate.

G. W. CARMACK, Pres. Carmack G. & C. M. Co., Index, Wash., is in San Francisco, deciding whether he will put in a smelter or concentrator at his property.

CHARLES H. SHERMAN of California has been nominated by the President to be assayer of the mint at San Francisco, to succeed the present incumbent, Assayer Elias.

PROF. WM. P. BLAKE, director of the School of Mines, has been appointed agent of the U. S. Mint for the collection of statistics of the precious metal production in Arizona.

E. J. LANDER of Sonora, Cal., who was instrumental in opening the Seminole, Star, Jumper, Norwegian and Greene mines, and who is now interested in several mining propositions there, is in San Francisco.

W. A. FERGUSON, until recently of the Westinghouse Electric Manufacturing Co., who has been installing electric plants at the Santa Ysabel and Harvard mines, Tuolumne county, Cal., has gone to the Moctezuma Copper Co., Nacosari, Sonora, Mexico.

NIKOLA TESLA says he will remove his laboratory from New York City to Colorado Springs, Colo., and there make his permanent residence. This time he "has perfected a machine by which he can transmit power several thousand miles without wires." N. T. is a good thing for the "science" supplements of the Sunday papers.

PROF. ELIHU THOMSON of Lynn, Mass., sends word (according to a doubtful press dispatch) from the City of Mexico that he has there pending, ready to issue, a patent on a "sun furnace," which, he says, is adaptable to smelting ores and generates heat more intense than the electric furnace. It is possible some one has been taking the professor's name in vain.

W. C. RALSTON, Pres. California State Miners' Association, has returned to San Francisco from an extended business sojourn on the Atlantic coast. While there he found time to do some effective work in awakening Eastern mining interests to the necessity of a Cabinet Secretaryship of Mines and Mining, and interviewed coast Congressmen regarding the feasibility of passing the California Mineral Lands bill.

Obituary.

THOMAS EGLESTON, who planned and founded the School of Mines of Columbia University, in which he was a professor of mineralogy and metallurgy, and who was prominent as an author of scientific works in this country and Europe, died on the 16th at his home in New York City, aged 68 years. Prof. Egleston was one of the founders of the American Institute of Mining Engineers, was its vice-president three times and was elected to the presidency in '86.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING JANUARY 9, 1900.

641,180.—SWIMMING APPARATUS—J. S. Bartholomew, Guerneville, Cal.
610,864.—NECKTIE FASTENER—J. W. Blundon, S. F.
610,865.—PILE DRIVER—J. W. Blundon, S. F.
641,185.—VALVE—C. A. Borein, Oakland, Cal.
640,875.—ADVERTISING DEVICE—E. Cherry, S. F.
641,192.—STEERING MECHANISM—J. Christensen, S. F.
640,768.—BUCKET DREDGER—J. H. Gray, S. F.
640,902.—GANG EDGER—D. B. Hanson, Seattle, Wash.
641,010.—HEMP BRAKE—J. Heaney, Gridley, Cal.
641,206.—FLOORING—S. Hedges, Los Angeles, Cal.
641,143.—WINDMILL—J. O'Toole, S. F.
640,933.—LUNCH BOX—A. J. Osborne, Pomona, Cal.
641,145.—SAFETY HOIST—T. H. Oxnam, Los Angeles, Cal.
640,940.—CATTLE GUARD—W. T. Payne, Tacoma, Wash.
641,229.—PUMP—A. L. Reynolds, Santa Ana, Cal.
640,947.—HOT AIR SYRINGE—J. L. Richards, S. F.
640,949.—AIR COMPRESSOR—E. A. Rix, S. F.
641,233.—WAVE MOTOR—C. F. A. Roell, Los Angeles, Cal.
641,239.—CANDLE HOLDER—H. Schroeder, Spokane, Wash.
641,242.—WINDOW SCREEN—R. M. Spencer, S. F.
640,971.—GOVERNOR—A. C. Stewart, Santa Paula, Cal.
640,849.—NUT LOCK—L. Wade, Escalon, Cal.
640,980.—ANIMAL TRAP—C. M. Williams, Los Angeles, Cal.
641,251.—WATER LIFTER—L. H. Woolley, Oakland, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

STEERING MECHANISM FOR VESSELS.—J. Christensen, San Francisco, Cal. No. 641,192. Dated Jan. 9, 1900. The object of this invention is to provide an improvement in that class of apparatus which is designed to steer vessels by other than manual power, and in conjunction therewith he employs a liquid brake or check mechanism. The invention consists of a cylinder having a piston movable therein, a piston rod extending through both ends of the cylinder, means for supplying a fluid pressure upon either side of the piston whereby it may be moved within the cylinder, tiller ropes or chains connecting with opposite ends of said piston rod leading to the tiller of the rudder and balance cylinders interposed between the power cylinders and the rudder.

SAFETY ATTACHMENT FOR HOISTING HATCHWAY.—T. H. Oxman, Los Angeles, Cal. No. 641,145. Dated Jan. 9, 1900. The object of this invention is to prevent dangerous and fatal accidents which occur in operating hoisting machinery by reason of the cage being carried up beyond its proper stopping place and into contact with the sheaves or other part whereby breakages are caused. This device consists of a wheel journaled in the shaft at right angles to the path of movement of the cage having a peripheral stop disposed in the path of the cage, a motor having a valve controlling the hoisting mechanism, and a rod or connection having one portion attached to the valve and another portion eccentrically and directly connected with the wheel so that the axial movement of the latter imparts an endwise pushing movement to the rod or connection, thus closes the valve or throws the motor out of action before the cage has reached the danger point.

MINING SUMMARY.

ALASKA.

L. F. Shaw of Seattle, secretary Miners' Association of Alaska, says: There will be many miners coming north, largely made up of practical placer and quartz miners, who will bring with them many years of mining experience, as well as sufficient nerve to protect the side of justice and fair dealing in the disposition of mining claims, and I trust will carry these principles into Alaska. The methods evolved in that region last year concerning locations are wrong in principle and absolutely repugnant to the American idea, and the Association should be able to enlist a sufficient force, from the large numbers going into Alaska, to settle at once, and for all time, the unholy practises performed there, showing these land grabbers that an equitable division of mineral ground must and shall be respected. A few men, well organized, in a mining camp are all that is needed to correct these abuses; a few good leaders of sufficient courage to step to the front and call for a showing of hands. A nucleus thus formed will have the moral support of all right-minded men, which within itself is irresistible, and so the reign of the usurer will give way to better things.

The Cape Nome Electric Light & Telephone Co. has incorporated in San Francisco to install at Nome a telephone system and an electric light and power plant.

Several expeditions are fitting out in San Francisco for Cape Nome.

Roos Bros. have chartered a small steamer and next March will depart with fifty men and enough provisions for two years. L. Harden, of Winnemucca, Nev., will, with a party of sixty men, take a vessel starting march 10. They intend taking their own provisions and a physician.

ARIZONA.

COCHISE COUNTY.

The Oregon mine is attracting attention. It has come into the possession of the Dos Cabezas Con. Copper Co. The ledge is from 12 to 14 feet.

GRAHAM COUNTY.

The Detroit Copper M. Co. proposes to build a railroad, the Morenci Southeastern, to Guthrie, on the Gila river, connecting with the Arizona and New Mexico railroad, nineteen miles long, narrow gauge.

The Detroit Copper Mining Co. at Morenci has done twenty miles of underground work during 1899, nearly five hundred miners being engaged. There is being built a large concentrating plant, capacity 500 tons per day, to treat ore valued at 60 cents per ton. There have been put in place six 125-horse power gasoline engines. The matte is converted by the pneumatic process. The output is 28 tons of ingot copper per day.

MARICOPA COUNTY.

Phœnix is to be supplied with electricity generated by water power 22 miles east of the city by the Arizona Water Co. The electricity is to be generated by 3-phase dynamos and will be transmitted to Phœnix at a voltage of 20,000 over aluminum wires. It is estimated that not over 6% will be lost in transmission. The line will be run by way of the Arizona canal falls, eight miles northeast of Phœnix.

PIMA COUNTY.

(Special Correspondence). — Tucson, which is a rival with Santa Fe, New Mexico and St. Augustine, Florida, as the oldest town inhabited by Europeans in America, is in many respects a remarkable old place. The first settlement is put down somewhere between 1555 and 1560 and is, therefore, approaching its three hundred and fiftieth year. It was an old fortified adobe town established by the Conquistadores when under the lead of Hernan Cortes. They came North in the pursuit of gold and silver, closely followed in their wake by Jesuits who established a few miles from here the San Xavier mission and endeavored to Christianize the wild Indian. In more recent years, before the advent of the Southern Pacific, it was known as the great central distributing point for hundreds of miles around here; goods being sent by wagon as far south as Guaymas in Sonora and even farther.

While still to some extent a Mexican town, there is a transformation slowly though surely going on. Wider streets, substantial sidewalks, three-story brick buildings and handsome residences are receding from the old Mexican quarter, leaving it a distinctive feature alone by itself. It is located on the Santa Cruz river in the northwestern part of Pima county and is its county seat. Its city limits are about two miles square, and its population is variously estimated at between 6,000 and 9,000. As a health resort it stands unsurpassed. The climate in winter being equable and while quite hot in summer sunstrokes are unheard of.

The School of Mines, under the administration of Professor Blake, is rapidly coming to the front as an educational institution. The town is soon to have a public library to which Mr. Andrew Carnegie, through the efforts of his old fellow townsman, R. W. Pittock of the "Star," has contributed the sum of twenty-five thousand dollars.

While Pima county has long been known as a mineral producer of gold, silver and copper, there are no producing mines of any consequence within a radius of twenty miles. Beyond this range, mineral is found everywhere in the mountains in greater or lesser quantities.

The property attracting the most attention at present is that of the Helvetia Copper Co., situated about thirty miles west of Tucson. It was located and held down under more or less unadventitious circumstances for some eighteen years, by an old miner named E. C. Hughes, who made occasional shipments from it, and an old furnace was erected near by in 1882, which treated some ore from time to time, which is now a ruin, and the slag dump from which is now being hauled back to the new smelter of the Helvetia Co., furnishing excellent fluxing material, as well as paying about 3% in copper.

About a year ago C. E. Udall, a young assayer from Denver, obtained a bond on the property and induced some gentlemen interested in and connected with the Calumet & Hecla copper mines of Lake Superior to look into the property, which resulted in a sale for the sum of $50,000.

The new company at once began in a business like manner, not only to open up the property, but to build a 150-ton smelter and a railway from the smelter to the top of the mountain, a distance of three or four miles. When the new company took hold, about the 1st of last May, there was one old "shack" and one tent on the property. Now there are several substantial adobe buildings, many frame buildings, and tents enough to furnish accommodations for a population somewhere between 800 and 1000. It is not a town in embroyo, but a town in fact.

The property comprises fifty-two claims, or about 1000 acres, and the ore, which is largely sulphide, carries from 8% to 20% copper. This is brought down to the smelter at a minimum of expense. Four hundred men are employed at regular Arizona wages, and if ever there was a contented and orderly community this is one.

The smelter has been running on black copper, with a loss in the slag of three-tenths of 1%. At the present writing it is shut down, owing to the lack of coke, which has to be hauled in wagons from Vial, a station on the Southern Pacific twenty-five miles away. The company has expended in development $150,000, in addition to the purchase price of the property. A fact worthy of remark is that the management of the company is entirely in the hands of young men, all but one of whom are from Lake Superior, and not one of whom seems to be over thirty-five years of age.

Right in the midst of the claims owned by the Helvetia Co. lies less than a whole claim known as the Mohawk, owned by the Lewisohns of New York, and which has produced over half a million dollars. The ore from this property is packed across the range on burros to Rosemont, four miles away, where there is a sixty-ton water-jacket furnace, at a cost of $3.50 per ton.

The Helvetia Co. is prospecting its property with a diamond drill, and its work was so satisfactory that it is worthy of remark here. They are running the drill two shifts of ten hours each with five men at a cost of $15 per day. On the two shifts they make from 20 to 30 feet per day in depth, and in soft ground more, at a cost of $1.50 per foot in addition. Ten barrels of water per day are necessary, and the cost of the drilling plant on the ground was about $4000. The drill here in use is good for a depth of 1200 feet. The manager of the company is so well pleased with its work that he is about to erect another.

The Azurite group is another copper property concerning which much has been written, and which has been reported recently sold. Your correspondent has reliable information that, while the papers have been executed, no money thus far has been paid. These mines were located by Howard Baynes in '88. In '98 the Azurite Copper & Gold M. Co. was organized by ex-Gov. L. C. Hughes, Gen. Thos. D. Sattewhite, Sherman M. Woodward, Thos. Hughes and Howard Baynes. They have over 4500 feet of development work on the property, together with a thirty-ton water-jacket furnace. The property is very highly spoken of by experienced miners who ought to know.

Tucson, Ariz., Jan. 12.

CALIFORNIA.

AMADOR COUNTY.

At the Kennedy mine a new station is being started in the north shaft at the 2300-foot level. The new vertical shaft now approaches 1000 feet in depth.

At the Mutual, near Sutter Creek, the new three-compartment shaft is down now 340 feet.

The Rhetta G. M. Co. has incorporated to mine in Amador county. Capital stock $300,000. The directors are John Ross, Jr., of Sutter Creek, G. Kratcher, J. L. Bryson, Plymouth, W. W. Worthing, H. Kaiser, W. B. Sampson, Stockton.

CALAVERAS COUNTY.

Stoping progresses in the Angels mine. J. V. Coleman intends putting a 40-stamp mill on the mine this year.

The Edna mine is reported sold to a Holland syndicate.

At the Gwin mine 170 men are at work, and eighty stamps in operation.

EL DORADO COUNTY.

Gazette: Prince & Willard, working the Cornucopia placer mine, on Rock Creek, made a shipment of three and a half pounds of gold last week. The gold goes $19.71 to the ounce. They use a self-shooter of 6000 inches capacity.

INYO COUNTY.

(Special Correspondence.)—At the Ratcliff mines the new compressor, built by the Compressed Air Machinery Co. of San Francisco, Cal., has been installed, and the first round of holes were put in on the 15th inst. The new 20-stamp mill is completed, and the tramway will be in operation by the 25th of this month. Development work is being actively prosecuted, and the ore bodies opened up have increased in size and are an exceedingly good grade of ore. In excavating for the ore bins at the upper terminal of the tramway, 148 feet vertically below tunnel No. 5, nearly 40 feet of ore was uncovered, assaying nearly $20 per ton. A tunnel has been started on this ore body, from which the cars will dump immediately into the tramway ore bins. Forty-five men are now employed at the mine.

Ballarat, Jan. 17.

KERN COUNTY.

The proposed Kern River Pipe Line & Storage Co. talks of a pipe line from McKittrick to Bakersfield, fifty miles, and the 4-inch piping alone would cost $150,000. Its effect would be to materially cheapen the delivery of oil from McKittrick into Bakersfield.

Work is to be resumed on the Little Butte mine at Randsburg.

LOS ANGELES COUNTY.

Mooney & Dunham will put a smelting plant on their copper mine, two miles below Acton.

NAPA COUNTY.

The following from Supt. Newcomb gives the production and shipment of quicksilver from the mines named during the year 1899: Napa Con., 5,850 flasks, Ætna Con., 3,800; Boston, 882. Total, 10,532 flasks.

NEVADA COUNTY.

The Union reports a rich strike in the Little Dublin mine on Little Deer creek, the ore assaying $18 to $36 per ton.

PLACER COUNTY.

Directors of the Pioneer Mining Co. say that the vein lost some months ago will be found. Forty miners are working in various parts of the property in search of the lost ore body. The mill was recently started up. A director says the company has $30,000 cash on hand.

Operations have begun again at Lynchburg, and good gravel, it is said, has been struck there.

Men are at work at the Basin Con. at Deadwood.

At the Crandall, where only five or six inches flowed out of the tunnel a year ago, fully 150 flow to-day.

Wm. Muir is working 25 men at the Weske.

Several of the Ophir mines are busy pumping water; the Three Star has not been troubled by an increase.

Herald: Work has been started again at the 140-foot level in the Bellevue shaft.

Colfax Sentinel: The new compressed air plant at the Red Point gravel mine, twelve miles above Forest Hill, is being installed. The engine is 15 feet in length and weighs 11,000 pounds. The compressor plant is located down the canyon 3500 feet from the mouth of the tunnel. Power is generated by using 40 inches of water that flows from the tunnel. The pipe line to the compressor gives a pressure of 656 feet, furnishing a minimum of 40 H. P. The company have purchased 10,000 feet of heavy pipe to convey compressed air to the charging stations. The main tunnel at Red Point is now in over 15,000 feet. The gravel was formerly dumped through a chute from an upper tunnel into cars in the lower tunnel at a point 2200 feet in. A start was made back 1800 feet from mouth of tunnel and 800 feet of new tunnel on a 3% grade connects the upper and lower tunnels. The Red Point mine is the first mine in Placer county to use compressed air for traction purposes. Seventy men are now employed at the mine. J. A. Ferguson is superintendent.

The Morning Star Mining Company have sold their telephone line from Iowa Hill to Colfax to the Sunset Company. A line has recently been put in between the mine at Iowa Hill and Sunny South.

PLUMAS COUNTY.

Supt. Farnum of the Four Hills mine has secured the services of five Comstockers to run drills in his mine.

SAN BENITO COUNTY.

The New Idria Q. mine, B. M. Newcomb, Supt., in '99 produced 4780 flasks.

SAN BERNARDINO COUNTY.

The copper mines at Copper City Camp, Morrow mining district, formerly belonging to the United Yucca and the Feejic mining companies, 38 claims, are bought by the Union Development Co. of Boston for $5,000,000; J. B. Neily of Boston president. J. I. Crowell has sunk a shaft 212 feet. He has also put down eight wells. From one of them, at a depth of 32 feet, there are daily pumped 3,000 gallons of water.

SAN DIEGO COUNTY.

Receiver Isaac Trumbo of the Golden Cross mines makes his third report, covering the month of November. The value of the clean-up for the month was $22,-959.25; receipts from other sources, $863.30. The payroll for the month amounted to $7200; fuel bill, $700. The litigation involving the mines on the desert will be carried to the Supreme Court again.

The sale of the Cincinnati Belle and Gold King mines, in the Banner district, to D. C. Collier, Jr., is reported, at $10,000.

SANTA CLARA COUNTY.

Twenty-one quicksilver mining locations have been filed at San Jose, each 1500 feet by 600, in the Uvas mining district, said to be on lands claimed by the Guadalupe Quicksilver Mining Co., which has recently made preparations for reopening the mines.

SIERRA COUNTY.

J. W. Finney is working the Sierra mine, near Downieville. More rain than in three years has fallen.

H. E. Averill, near Hawley Lake, is putting considerable improvement on the Four Hills mine, and anticipates a busy season.

SHASTA COUNTY.

During the late storm the dam at the National mine, holding tailings, gave way and the center of the mass was washed down the gulch. Half were lost. The portion swept away was the richest, being in the center, and consequently the deepest. Some of the richest went $8 a ton.

T. H. Oxnam, general manager for Capt. De Lamar at Bully Hill, near Redding, tells the Free Press that he thinks he will begin the erection of a smelting plant in the spring or early summer, and that an expert is expected from the East soon to take up the business of preparing for a smelter.

The Sacramento river is to be bridged at Keswick. The mines on the east side produce low-grade quartz which can be cheaply worked at the smelter. There are now three aerial tramways across the river conveying quartz.

Buick & Wengler have a contract from the Mountain Copper Co., Keswick, to deliver this year 10,000 cords of wood at $3 a cord.

SISKIYOU COUNTY.

Journal: The first payment of $10,000 on the bonded Dwinnell group of quartz ledges on Squaw creek, near Gazelle, was paid last Saturday, and the balance of the $125,000 will be paid at stated periods later on.

TRINITY COUNTY.

(Special Correspondence).—The Trinity river has been higher this winter than any time since 1882. Sluicing on the bars will be good this season. Where I worked off the gravel last year it has refilled, and there seems to be as much fine gold in the new deposit as there was in what I worked last year.

Bragdon, Cal., Jan. 12.

The Bloss & McClary mine at Trinity Center will now flume its tailings to the Trinity river

Some of the Coffee Creek mines have closed until April. The Golden Jubilee mine, under the management of J. C. Steele, is running steadily. The Altoona mine is also running.

TULARE COUNTY.

The Register and Receiver of the Land

Office at Visalia, in a hearing to determine the character of land upon protests filed by the mineral claimants against what is generally known as forest reserve lieu selections under the act of June 4, 1897, have decided that where valuable mining locations exist the burden of proof is on the agricultural claimant to prove the land is non-mineral in character; that where there are no valid mineral locations the burden is upon the mineral claimants. They hold that the seeps of petroleum or bitumen in rock in place is sufficient upon which to base a valid mineral location.

TUOLUMNE COUNTY.

(Special Correspondence).—In the chain of mines northwest and southeast of Carters, the strike and dip of the vein in each suggests that many of them are located upon the same lode. Beginning with the old Eureka mine, whose surface ground is now covered in part by the town limits of Carters, the first to the southeast is the Dead Horse, next the Lady Washington, now idle, with its tunnel running into the steep bank of the North Fork of the Tuolumne river; then the Richardson, an undeveloped location; next the Grizzly, on the east side of the river; then the Bonito and the Consuella. The Providence is thought by many to be on the same vein; others believe it is on a parallel vein. Beyond the Providence come the New Years, McKinley, etc. To the northwest of the Eureka lie the Cherokee, Laura, North Star, Carlotta, Pennsylvania, close to Carters; the Columbus, at Cherokee; the Uncle Sam, Laurel, Dreisam, Rising Sun and the Blue Lead at Arrastraville. This makes an interesting chain of mines, all of which have just been visited by your correspondent.

The Dead Horse, the oldest of the active properties, belongs to the Consolidated Eureka Gold Mining Co. The incline shaft is down 1550 feet. The mill is equipped with twenty stamps and eight concentrators, and there is a cyanide plant for the sulphurets. The motive power at the mill and hoist is water. Thirty-six men are employed. The labors of Superintendent Fred Corkhill at this mine are supplemented by the able counsels of Foreman Dennis Kane, who has recently been sent over from the Utica mine, in Calaveras county, where he held a similar position.

The Grizzly is two miles from Carters, on the steep east bank of the river. The tailings from a 20-stamp mill are flumed several hundred feet to the concentrator building, near the bed of the stream. This arrangement scatters the plant, but it seems unavoidable on account of the precipitous formation of the river bank. Water under both high and low pressure is used for power, the latter being supplementary to the former. In the first instance the water is bought from the New Albany Company, which owns a ditch along the river bank; in the latter instance the Grizzly gets free water from the river a short distance above the concentrator plant and flumes it to a turbine wheel opposite the mill, where a wire cable transmits the power to the works at the mine. At present there is a lull in the work of drifting and stoping at the Grizzly, and the mill is idle. The largest force of miners practicable is engaged in sinking below the 700-foot level, and as soon as an 800-foot station is established, an increased force will be put on, and the mill will be started. W. R. Hall is superintendent at the Grizzly.

The Barry mine joins the Grizzly on the east, it being a parallel location, and a promising one. Three tunnels at different levels have been run in on the vein; the one now being driven will give 700 feet of backs. Assays show that the ore runs as high as $78.20 per ton in free gold, with sulphurets worth $1100 per ton. Average assay value, $21.19 per ton of ore. There are three veins in the location, the one developed being in slate and granite, with a width of 3½ feet.

The Carlotta and Pennsylvania mines are the property of the Carlotta Mining Co. of San Francisco, a corporation composed largely of S. P. Railroad people. There is a steam hoist at each mine, with a seven-stamp mill (one five and one two-stamp battery) at the Carlotta. The mines are idle at present, having been closed down last August after an unfortunate experience by the lessee, D. Neagle. It is thought locally that proper management would render these mines profitable. The shaft in the Carlotta is down 220 feet; in the Pennsylvania, 200 feet.

Salt Lake parties have a bond on the Laura and North Star mines. Development work goes on under the superintendency of W. C. Oakes, who has had many years experience in California, Idaho and Montana mines. The work is being conducted from the shaft at the Laura, where 400 feet in depth has been attained. From here a drift is being run northwest to strike the old North Star vein, which yielded excellent ore thirty years ago, under the ownership of Lombardo, an feet, and from surveys made it is thought the vein will be encountered within the next 75 feet. The Laura contains an undeveloped shoot of ore, which can be worked in case the North Star vein does not come up to expectations. There is a separate steam hoist and 10-stamp mill at each mine, all being the property of the North Star M. Co.

At the Uncle Sam mine, Arrastraville, it is the intention to continue sinking from the present lowest level—200 feet—to the 400-foot level, when a crosscut will be run to tap the vein. There is now a crosscut tapping the vein 173 feet. The plant here is small, but modern and effective. E. G. Dell is Supt. The parties having the mine under bond are business men of San Francisco.

The shipshape, clean and modern appearance of everything at the Dreisam mine is what first impresses the visitor. Besides the hoist there is a mill containing two 2-stamp batteries, two concentrators, etc. Water is the motive power employed, but a steam outfit is held in reserve. The shaft is down 230 feet, where a crosscut is being run for the Ophir vein, which it is expected will be tapped within 80 feet. There are three veins in the location, from one or the other of which plenty of good ore is now being taken to keep the mill going. As the three veins pitch toward each other at varying angles, the owners think they will have a rich ledge below the point of intersection. An electric light plant for the mine is about to be installed. Wm. Moorehead is Supt. The owners are the same as those in the Dutch mine, at Quartz Mountain, Gus Trittenbach being president of the company.

At the Laurel, Supt. J. W. Richards is sinking on the ledge, which he states has widened to nearly 3 feet and shows continued improvement. The plant consists of a steam hoist only. A considerable quantity of good ore is stacked up, waiting the day when a mill may be installed.

At the Rising Sun, Arrastraville, sinking is being done on the vein from the 185-foot level in the tunnel. It is proposed to ascertain the extent of the ore shoot. Ninety tons of ore were milled last summer which yielded $1150. The prospects here are excellent. J. L. Tonkin is Supt.

Your correspondent found work at the Confidence mine in full swing. This is one of the largest active properties north of Sonora, and gives employment to fifty or sixty men. The main shaft is down 800 feet, and a high grade of free-milling ore is fed to the twenty stamps in the mill. The elevation at the Confidence is 4000 feet above sea level. Neil Carmichael is Supt.

Your correspondent met at Sonora J. W. Brown, M. E., Supt. of the Temescal M. Co.'s properties, above Confidence. Mr. Brown declares that he is now, for the first time in his life, in a position where he has "too much mine for his mill." As he controls eight or ten claims and has only a 5-stamp mill run by a hurdy-gurdy wheel, this situation is easy of comprehension. His company should increase his mill equipment. He has been running ore worth $38 per ton. The owners of the Temescal properties are the same as those in the Champion and allied mines of Nevada county.

The Black Oak mine, near Soulsbyville, was described at length in the MINING AND SCIENTIFIC PRESS about one year ago. There are thirty stamps in the thoroughly equipped mill; a short distance below is one of the largest cyanide plants in the State. The concentrated tailings from the mill are treated by the cyanide process, and not the sulphurets. The latter, as well as a considerable percentage of assorted ore, are sent to the Selby Smelting Works. The ore sorting is done by Chinamen, who are said to be expert at this work. Two-fifths of the value of the ore is caught in the batteries and on the plates. Seventy men are employed. W. P. Scott, one of the owners, is superintendent: his brother, W. G. Scott, also joint owner, is foreman of the mine.

Work on the Draper mine, near the Black Oak, has been temporarily suspended on account of an unusual flow of water, which will be speedily got rid of. L. H. Bartlett of Boston, Pres. of the company, is in charge. The Draper has been a big producer in the past.

C. E. Condy and L. Leonardini, owners of the Mary mine, near Arrastraville, whose 2-stamp mill was destroyed by fire in November last, will rebuild in the spring.

The Hazel mine, in the Keltz mining district, started its new mill on the 1st. It contains two (1000-lb) 2-stamp triple discharge batteries, two concentrators and steam air compressors. It can reduce about twelve tons of ore per day. The ore is heavily sulphuretted, and the gold carries a percentage of tellurium. The mine Italian count. The drift is now in 1100 is opened by a tunnel 500 feet long, tapping the vein at a point 200 feet vertical. Drifts run out 125 feet in each direction from the tunnel. The vein now being worked is from 2 to 4 feet wide. There are four parallel veins belonging to the Hazel Company, three of which have been cut by the tunnel. The mill is run with free water, under 300-foot fall, taken from Five Mile creek. If this supply fails, recourse may be had to the Tuolumne Water Company's big ditch, which runs above the mine. W. B. Moore is superintendent of the Hazel mine; the owners are San Francisco capitalists and business men.

The work of building a 60-stamp mill for the Harvard mine, near Jamestown, is now progressing rapidly, and the structure is about ready for its equipment. The stamps will be placed upon a foundation of wooden pillars, solidly bedded in concrete and packed gravel. An electric plant is being installed to run the mill, air compressors and blowers, power to be supplied by the Tuolumne Water & Power Co. There are two hoists, both run by steam. Shaft No. 2 is down 750 feet, and is connected by a drift with No. 1. It is expected that the Harvard will employ 100 men when in full operation.

The bonding of the Genoa, an old and idle property on the outskirts of Sonora, is looked upon as an important item at the Tuolumne county seat. The Genoa produced much gold from surface workings many years ago, and showed good ore in tunnels run into the vein from the hillside. It was known as the Golden Gate Extension. It is the intention of the new company to go into the old tunnel, run an upraise to the surface, put in a hoist and follow the hanging wall down. By piping water 600 feet an enormous pressure can be obtained to run air compressors or other machinery. Messrs. J. A. Gleason and P. M. Keefe have a bond on the Genoa.

A mining enterprise which is attracting more than ordinary attention in Tuolumne county is that of the Carters G. M. Co., who are about to develop the Spring Gulch and Canyon mines, several miles southwest of Carters. The mine was bonded a few months ago by Messrs. Willet & Eggert for $30,000. The old Spring Gulch vein was a great producer in early days, and was of unusual width and well defined. In the working of the vein the miners came upon a fault—the ledge broke off abruptly and for a time was lost. Future development has located the lost vein. It is now proposed to develop the property by running a tunnel into the vein from the side of the gulch. At the mouth of the proposed tunnel there is almost unlimited free water power, and it is calculated that the Spring Gulch ledge will be tapped within 1000 feet, thus giving from 1000 to 1200 feet of backs on the dip of the vein. It is also expected that the tunnel will cut at a considerable depth another well-defined vein which crops out at the surface. Both veins will be worthy of development. Sufficient ore to keep a mill at work can be taken out of existing tunnels tapping the Spring Gulch vein, and it is proposed to erect a mill the coming spring. Many consider this one of the most inviting propositions in the county.

Jamestown, Jan. 14.

(Special Correspondence).—At the Arbona mine drifting progresses on the 300 and 400 foot levels. The shaft is down 533 feet, showing good milling ore.

Tuttletown, Jan. 16.

T. J. Russell, Supt. Shawmut mine, near Chinese Camp, contemplates putting in a reduction plant at his mine.

The mill at the Arbona mine is running constantly.——G. Blake has closed the O. K. mine temporarily, preparatory to putting up new machinery. ——At the Gagnere property R. Long, Supt., the three-compartment shaft is being sunk from the 180 to 500 feet.—— G. F. Dyer, Supt. Draper mine, is East, where he will arrange for starting work on the tunnel at the Horse Shoe Bend quartz mine, on the Stanislaus river.

COLORADO.

CHAFFEE COUNTY.

(Special Correspondence).—New plants of machinery are on the Anaconda, Gold Bug, Veivendeer and Queen City properties. The Queen City has a shaft 60 feet deep deep and 4 feet of ore that averages $42 per ton.

Turret, Jan. 11.

In the Turret district, only two years old, are four plants of machinery, and three more will be put in early this year. The formation is granite, with porphyry and phonolite dykes cutting the formation; the veins parallel these dykes. The altitude is about 900 feet. The payroll is now over $6500 per month.

GILPIN COUNTY.

About 100 men have been laid off on the Cook mine, Central City. Mgr. Colvin says he had word to stop all operations from the Boston owners, on account of the injunction restraining the company from working on the west side of the shaft. This injunction is in a suit brought by the Big Hatchet M. Co., operating the Washington claim, west of the Cook shaft, and who claim that the Cook people are working on their Washington vein. The Cook M. Co. has been giving employment to over 100 men. Its payroll has been from $8000 to $10,000 per month, and its expense account $5000 for the same length of time.

Carpenters are at work on the framework of the new mill at Black Hawk.

At the California mine the foundation for the large hoisting plant is completed. Mr. Hannigan has men at work on the shaft building.

LAKE COUNTY.

According to the Denver Post, the bulk of Leadville's zinc product, which is quite large, is now going to the great smelting works at Vielle Montague, a strip of neutral territory between France and Germany, where zinc has been mined ever since the year 1400, and is the largest producer of that metal in Europe. The smelters there draw their supplies from all the world, and, if Leadville can furnish 20,000 tons of the right kind of material, these ancient works will take all of it. This would add $800,000 a year to the product of the district.

Chronicle: Co-operative mining on a large scale is the feature of the operations of the Maid and Henrietta. There are sixty-five men at the two shafts, with no bosses and no book-keeper. Every man is his own shipping clerk and does his own caging. There is no confusion whatever, and the men have little trouble in the management of their affairs. The ground is leased by the owners to the Maid of Erin silver mines lease, of which Lincoln Raynolds is Mgr., and this company in turn divides it up among a great number of tributers, the settlements for the ore being made by the Maid Leasing Co. The engineer is in the employ of the company, and, by mutual consent of the various companies of lessees, he decides how long each lessee shall use the cage. Each man underground comes in for his turn to hoist every so often during the day. The mining at the Maid and Henrietta is probably the cheapest in the camp. All superfluous help is done away with. Time keepers, foremen, clerks of all kinds, as well as superintendents and managers, do not have to be paid, and the result is that the expenses, being reduced to a minimum, the very lowest grade ore in the camp can be mined.

SAGUACHE COUNTY.

Tellurides are reported in the Little Alec mine on Star mountain; porphyry, trachyte and andesite are the eruptive rocks that cut up or overflow the metamorphosed granites. Such geological formations are favorable to the gold fissures of depth and continuity.

SAN MIGUEL COUNTY.

The Pittsburg company which has been experimenting with the ore of the Klondike mine, at Ophir, to determine the best process for its treatment, has decided to adopt a combination of amalgamation and cyanide, and will construct a 100-ton plant equipped with stamps and amalgamating plates. From the plates the entire product of the batteries will go to the cyanide tanks.

The new cyanide tank of the Gold Recovery Co. at Telluride has begun treating ore.

SAN JUAN COUNTY.

Dr. Pascoe, who is working for a smelter at Silverton, tells the Standard that the low grade ores of San Juan county cannot be treated at a profit by chemical processes that have proved profitable in other camps, and that there is not a single mine in the county whose ore can be profitably treated by amalgamation alone. There is only one mill in the county at the present time that is employing this treatment to save part of the values in their ore.

There are twenty-four concentrating mills lying idle in the county and only four working, which shows that there are only a few ores adapted to wet concentration. What most San Juan ores need is concentration by fire instead of water. To be successful the process must be cheap and located at a central point. There is considerable territory adjacent to Silverton where ores can be mined and laid down for $6 per ton. With a treatment charge of $6 per ton at that point ore worth $14 would pay a net profit of $2.

SUMMIT COUNTY.

Journal: There is not a mill in Summit county operated as a custom gold ore mill, and small operators can only get their product treated at intervals and as a favor. There is a good opening for a modern gold mill equipped with appliances for concentrating the values in the mill tailings; a mill that would treat the ore for $2.50 per ton or that would pay 75% of the sampling value of the or, ore even 60%.

TELLER COUNTY.

(Special Correspondence).—The Imperial

G. M. & L. Co., operating on Block 1 of Dexter claim, on Bull hill, have cut the vein at 200 feet depth, the screenings from which ran from three to five ounces gold to the ton. In a drift of 65 feet on the vein assay values of $70 per ton were obtained. A drift now in 60 feet is being driven for the Big Blue Bird vein, and they expect to cut the latter at 75 feet. The company's lease on this property runs twenty-three months from Jan. 1, 1900. The stock is held by W. G. Campbell of Denver, W. L. Beatty of Goldfield and others. The property is under the management of Mr. Beatty. A shipment of fifteen tons gave a return four ounces to the ton. A twenty-two-ton shipment was made on the 16th inst. WASCOTT.

Goldfield, Colo., Jan. 13.

IDAHO.

The Peacock mine, at Seven Devils, has not been sold to the Boston & Seven Devils Co., but nine-sixteenths of it has been bonded by the Northwest Copper Co.

LATAH COUNTY.

At Kendrick the Dewey mine and other properties of the Dewey Co. at South Fork are bought by Toronto, Canada, men, P. Clark and others of Spokane, who get a controlling interest and pay $100,000, of which sum $50,000 will be spent operating the mine. The remaining $50,000 goes to the Dewey Co. to meet the obligations of the company. The purchasers are in charge of operations.

SHOSHONE COUNTY.

Spokesman-Review: The year 1899 has done more for the gold belt of the Cœur d'Alenes by clearing the way for 1900 than by increasing the output for itself. During the year Boston capitalists have bonded twenty-six miles of placer ground remaining unworked in the district. One payment has been made on all of this and two on much of it. It was too late in the season, however, when the work was undertaken to accomplish much, although there has been time for preparation for another year which will surpass any work, in its magnitude, ever undertaken in placer mining in Idaho. Dams are to be erected near the headwaters of the different branches of Prichard creek, to form reservoirs for the storage of water, and hydraulic mining on a large scale will be carried on. Where dredgers can be worked to advantage there will be dredging.

MICHIGAN.

The output of copper mines in '99 is estimated at 80,000 tons, which at 16 cents per pound, represents $25,600,000. In 1880, the Michigan copper product amounted to 40,000 tons, valued at $7,500,000. The output has doubled in twenty years. The value per ton of the product has increased nearly 70%.

The Calumet & Hecla Co. is shipping a large consignment of copper to Russia by way of San Francisco, Nagasaki and Port Arthur, China. The expense of overland shipment is very heavy and the dispatch with which the order is being filled marks urgent requirements, leading to the presumption that the copper so obtained is destined to fill pressing needs in naval and military equipment.

MINNESOTA.

J. J. Hill has leased a large portion of his 5000 acres of iron-ore land on the Duluth, Mississippi & Northern, which road also belongs to Mr. Hill. The iron-ore land is leased to Corrigan & McKinney, of Cleveland, who will mine the ore for shipment. From this tract about 10,000,000 tons of ore have already been taken.

MONTANA.

The State Mining Inspector reports that the number of men employed in the mines of Montana was 13,316 in 1899; in 1898, 11,696.

E. B. Braden, in charge of the United States assay office at Helena, has just given the metal production of the State for last year, showing an increase in the output of $14,091,233.54 over that of 1898.

DEER LODGE COUNTY.

The Anaconda mine is changing its crushing machinery from stamps to rolls. The present crushing capacity is 5500 tons per day, and the substitution of the rolls will, it is thought, permit a crushing of 7000 tons every six hours. The company has six furnaces with a daily capacity of 200 tons each. Three new furnaces will be erected, so that the total blast furnace capacity will be doubled and 2400 tons of ore smelted daily. The hoisting machinery will enable the mine to supply 7000 tons of ore per day for the smelters. The total capacity of the entire plant is now 12,000,000 pounds of metallic copper per month, of which 2,500,000 pounds is the product of six blast furnaces now in use. When the new furnaces are in operation, the entire output will be 14,500,000 pounds per month, or 174,000,000 pounds per annum. It is said that the Amalgamated Copper Co. will increase the output of metallic copper, from Butte alone, by at least 30,000,000 pounds per annum.

MADISON COUNTY.

At Sheridan the Zella M. is equipped with a compressor plant and all work is done with machine drills. The shaft is 180 feet in depth. One tunnel, 500 feet in length, cuts the ledge at a depth of 250 feet.

SILVER BOW COUNTY.

The newest thing in pumping is a six-cylinder, triple expansion condensing mine pump, at the 1100-foot level of the Original mine, designed specially for the place. It is not a strictly high-duty pumping engine, but presents a number of features that render it specially interesting to miners. There are two high pressure steam cylinders, each 9 inches in diameter, two low pressure cylinders, each 22 inches in diameter; duplex water plungers 5 inches in diameter, all of 18-inch stroke. The entire water end is of phosphor bronze of special composition, made to resist the action of acids in the water. There is a jet condenser with a special bronze water end. This engine is to deliver 200 gallons per minute against 450 pounds pressure per square inch, with 100 pounds steam pressure at the throttle, and is expected to show a duty of about 75,000,000 feet pounds, or to perform the work with an expenditure of only 3350 pounds of coal per twenty-four hours.

NEVADA.

DOUGLAS COUNTY.

A 1200-foot tunnel is being run by the Pacific Copper Co., hoping thereby to obtain 500 feet of stoping in high-grade ore.

EUREKA COUNTY.

The Sentinel estimates the miners of that district have received over $126,000 for the ore they have shipped out in the last six months.

LINCOLN COUNTY.

A cyanide plant of 150 tons daily capacity is to be installed in the Horseshoe mine, Deer Lodge district.

LYON COUNTY.

The Rock Point mill and the cyanide plant are both shut down now on account of cold weather and ice in the river.

ORMSBY COUNTY.

(Special Correspondence).—There exists near Carson City a vein of tin ore 15 feet in width, carrying 25% of tin. Negotiations for its sale are now under way and active work will, no doubt, soon commence to develop and operate it on a large scale. Tin ore of 3% is considered good grade.

Carson, Jan. 14.

STOREY COUNTY.

The machinery for the gypsum pulverizing plant at the Mound House is in transit from San Francisco.

WASHOE COUNTY.

The Royal Star M. Co. have been formed to work the old Steamboat gold and copper mine at the southern end of Truckee meadows.

Wallace & Pinney propose to buy the Tri-Metallic and W. H. Teller mines at Antelope, and to pay $4 a foot to Captain Griffin for running a 400-foot tunnel to tap the ledge.

NEW MEXICO.

In the Cochiti mining district the properties known as the Lone Star group have been bought by the Navajo Gold Mining Co. The revenue stamps on the papers called for $1800.

The reported sale of the Cerillos smelter by Stephen Baldwin of Detroit to the Hardscrabble Mining Co. of St. Helena is denied in Santa Fe.

OREGON.

Congressman Tongue is trying to have an assay office established at Portland.

BAKER COUNTY.

Work has been resumed on the Badger mine at Susanville under the management of A. Brile.

The new 10-stamp mill on the Magnolia mine, Granite district, owned by the Magnolia M. Co., W. L. Vinson Mgr., has started.

The Red Boy will sink a three-compartment shaft 500 feet below the present lowest level before drifting is done. The machinery will have a capacity of putting the shaft down 2000 feet. The first purchase of machinery will cost about $40,000.

J. G. English has from the Golconda mine $10,000—the result of a recent run in the new 10-stamp mill.

Two carloads of machinery are on the way for the new smelter at Sumpter.

WALLOWA COUNTY.

A copper strike is reported at the mouth of the Imnaha river, on the Snake River Chief ledge—one of the Hibbs group. The ore is red oxide of copper.

SOUTH DAKOTA.

CUSTER COUNTY.

The Carr mine near Custer, which was found last May by Carr Bros. and which attracted much attention at that time by reason of the very rich gold rock found, is proving a perplexing geological problem to the owners, owing to the irregularities of the vein, which, occurring in a mica schist formation parallel with the strike of the rock, exists as a series of disconnected lenses, difficult to follow until the system of their distribution is understood, which can only be accomplished by development.

PENNINGTON COUNTY.

Machinery formerly in use on the Snow Storm, Bald Mountain, has been moved to the Blue Lead mine, near Hill City, and will be used in driving a tunnel, now in 400 feet, to strike a copper ledge. A man with a hand drill cannot make more than 18 inches a day. With the drills it is expected that from 8 to 12 feet can be made in a day. The tunnel is timbered 300 feet. The ore vein will be reached at a depth of 610 feet.

UTAH.

JUAB COUNTY.

Miner: A great many locators of mining property have been sending one notice of location to the District Recorder and one to the County Recorder for recording. Section 9 of the State mining law distinctly says that both notices must pass through the hands of the District Recorder, and provides a penalty of $500 for failure to comply with these directions. Thus the County Recorder is liable for accepting notices that do not come from the District Recorder, who must insist on duplicate notices and two fees.

SALT LAKE COUNTY.

The management of the Bingham Copper and Gold Mining Co. will immediately let contracts for the new smelter. It will be of the pyritic type, daily capacity 200 tons; two stacks, each of a capacity of 100 tons per day, built in such a way that either may be operated independently.

SUMMIT COUNTY.

The Marsac mill at Park City will be changed to permit handling the ore of the Ontario mine. The Ontario Mining Co. will in future pay dividends quarterly.

TOOELE COUNTY.

The report of the Silver King shows that during '99 it produced ores valued at $1,000,000 and distributed $650,000 dividends. Manager Kearns is driving the drift off the 1300-foot level to tap the ore chute upon its dip next July. The ores marketed showed an average of 45% lead, 46 ounces silver and nearly $5 per ton gold.

The Geyser-Marion Mining Co. from its mines at Mercur produced during '99 43,271 tons of ore, from which it extracted $113,631.59 and netted $18,394.05. The expense of mining, extraction and opening up new ground during the year was $1.43 per ton, actual cost of milling 67 cents, a total of $2.10 for mining and milling.

UINTAH COUNTY.

The $200,000 option on the mines and smelter of the Dyer Mining Co. near Vernal has been relinquished. E. D. Nelson has gone to British Columbia to look for a property that will satisfy his syndicate.

WASHINGTON.

The Times says there is scarcely any snow in the mining districts of Index, Silverton, Sauk, Sultan or Miller River, excepting far up in the mountains. There is less this season than is recorded for any previous year in January.

STEVENS COUNTY.

The Gold Ledge has been inspected by Mgr. Lilienthal and Supt. Crummer of the San Poil and Blacktail mines, Republic. The ledge is 5 feet in width, a portion of the filling not pure quartz. There is in the face of the drift about 3 feet of ore. The working shaft is 135 feet deep.

Deer Trail No. 2 and the Bonanza companies are to be consolidated, with headquarters at Toronto. The capital stock will be $2,500,000. The Deer Trail mine is in Cedar canyon and the Bonanza is at Bossburg. Both are dividend payers, capitalized at 1,000,000 shares each. Stockholders will be given share for share in the consolidated company and the 500,000 additional shares will go into the treasury. Both mines are controlled in eastern Canada, although officered by Spokane men. They will be operated on a larger scale.

FOREIGN.

BRITISH COLUMBIA.

The output of ore in the Rossland camp for 1898 was 116,697 tons; in 1899 it was 183,670 tons, an increase of 66,973 tons. The value of the 1898 product was $2,804,758; of the 1899 product, $3,306,060, a gain for 1899 over the previous year of $501,302.

Carl F. Raht has gone from Libby, Mont., with H. C. Walters, to the latter's copper property, thirty miles north from Vancouver, three miles from the seacoast. The group consists of seven claims, and the lead is from 12 to 28 feet in width. The ore is a copper sulphide, and reported to run from 8% to 15% copper. R. Seifert is foreman. The name of the property is the Britannia.

Vancouver reports the transfer of the White Horse copper group of claims to the Rothschilds for $2,000,000.

At Greenwood J. T. Smith has organized the Republic Gold Mines of Greenwood, B. C., non-personal liability, to acquire the Republic, Nonesuch, Last Chance and Hidden Treasure mineral claims, in Smith's camp, Kettle river mining division; capital $100,000.

The McRae Copper Mines, Ltd., non-personal liability, have been incorporated, to purchase the Ah There and Sidney M. Johnson mineral claims, Deadwood.

A petition has been presented to the Legislature from all the leading mines of West Kootenai, representing $50,000,000 of capital, seeking the repeal of the eight-hour law and declaring it had been prematurely and improperly introduced, and had excluded capital and deprived mine owners of working at a profit. Its constitutionality is challenged, and the declaration is made that, unless it is repealed or amended, it will be necessary to close the mines or cut the wages.

At the Ymir mine a tunnel is being run from the mill to tap the ore body at great depth. The length will be 3000 feet. It is to be made large enough to allow laying two parallel tracks. The gravity tramway now in use will be thus superseded.

MEXICO.

(Special Correspondence).—At a meeting of the stockholders of the Guanajuato Con. M. & M. Co., January 5, 1900, at the offices of the company in New York, the old board of directors was re-elected and the following officers elected for the ensuing year: F. G. Corning, Pres.; Sidney Green, Vice-Pres.; E. A. Wiltsee, Second Vice-Pres.; Thos. J. Hurley, Sec. & Treas. The Exploration Syndicate was also reappointed the New York fiscal agent. The output of the mill for October, November and December averaged about $22,000 per month. The company owns the Sirena mine at Guanajuato, also the San Vicente, the Barragana, and an interest in the Rayas mine.

N. Y., Jan. 6.

SOUTH AFRICA.

J. G. Stowe, the American Consul General at Cape Town, says that the exodus of uitlanders from the South African Republic and Orange Free State has been unprecedented in history.

"Many of these people—the mining population, the bone and sinew of the country," he says, "have scattered over the world. Numbers of them too poor to get out of the country are subjects of charity in the cities of Cape Colony and Natal, and have to be fed. Some have funds for a few days or weeks, but will in time have to be supported by the public, and this in a country that can not or does not produce the foodstuffs for its own people. The English army is fed with supplies from other countries, and, while much of these may have originally come from the United States, they reach here via England. The customs duties and railroad and telegrah revenues have fallen off. As the railroads and telegraphs are owned by the government, a very large source of government support is lost, to say nothing of the employes thrown out of work. Johannesburg, in the Transvaal, and Bloemfontein, in the Free State, are to all intents and purposes deserted cities. Johannesburg, the largest commercial center in South Africa, has, so far as trade is concerned, ceased to exist. This once busy, bustling city, producing monthly over fifteen tons of gold and yearly $60,000,000 worth, is silent. Up to this time goods have reached the Transvaal via Delagoa bay, but it is not supposed that they will long be permitted to enter. The two republics must then live on their own resources. Their crops are ready for the sickle, but can not be cut, as the men are off to the war. "Prices are so high that the trade papers refrain from publishing the usual column of 'market prices.' Large quantities of gold en route to seaports in this colony for shipment to England have been taken by the Boers. Representatives here of export commission houses of the United States are constantly booking and cabling large orders, particularly of foodstuffs, but word comes from the canners of meat and fish, makers of flour, corn meal, etc., that they have about all they can do to supply the home demand, and are many weeks or months behind orders."

THE KLONDIKE.

The Yukon Sun estimates 7000 to be the present number of men at work in the Klondike.

Latest Market Reports.

SAN FRANCISCO, Jan. 18, 1900.

SILVER—Per oz., Troy: London, 27⅜d (standard ounce, 925 fine); New York, bar silver, 59½ cts. (1000 fine); San Francisco, 59½: Mexican dollars, 48½c.

Renewed buying of silver by the Indian Government, the Statist says, can not be much longer delayed, in consequence of rupee coinage requirements, and this will lead doubtless to marked improvement in the price of silver.

The director of the mint has ordered that the New York U. S. assay office furnish gold bars for exports from that port at a charge of 4 cents per $100 instead of 10 cents, which has been the rate for eight years. The charge was raised in the belief that it would restrict gold exports. It is now expected that the foreign bankers will utilize gold bars again.

COPPER. — New York, Lake, $16.50; electrolytic, $16.00; casting, $16.12½; St. Louis, $16@16.25; San Francisco, 17⅛@18. Mill Copper plates, 23¾c; bars, 25¾@27c.

LEAD.—New York, $4.70; St. Louis, $4.75; San Francisco, $4.75; pipe 7½, sheet 8¾, bar 6¾c. London, Soft Spanish Lead, £16 10s=4.62c per lb.

SPELTER. — New York, $4.55; St. Louis, $4.50; San Francisco, ton lots, 5¾c; 100-lb lots, 6¼c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 10c; 300 to 500 lbs., 11@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 3, 6¼c.

IRON. — Pittsburg, American soft, $25.25; Scotch, $26.50; San Francisco, bar, per lb., 3¼c.

STEEL.—San Francisco, bar, 10c to 20c per lb.

QUICKSILVER. — New York, $52.00; London, £9 13s; San Francisco, local, $51.50 ℔ flask of 76½ lbs.; export, $47.

PLATINUM.—San Francisco, crude, $14 ℔ oz.; manufactured, $19@22.

FERRO-MANGANESE. — San Francisco, ℔ ton, $30.

ZINC.—San Francisco, 5¾; slab, 6½c; bar, 8.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

TIN.—New York, pig, $26.50; San Francisco, $29; bar tin, ℔ lb, 35c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 40c to 50c.

NICKEL.—New York, 40@45c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.80 50-lb lots; San Francisco, $2.50 to $3 lb lots.

CANDLES.—Granite 6s, 16 oz. 9¼c; 14 oz., 8½c; 12 oz., 7½c; 10 oz., 6½c.

FERRO-TUNGSTEN.—New York, 60c; San Francisco, 75c (60%).

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs' $10.05; Colorado Anthracite, $14.50.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 34@36c ℔ lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, 1¾c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, **Money** loaned mines, **Mining** companies organized, their property expertd, financed and managed, **Mines**, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, **Examine** mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and Chemical work done. EDW. N. BREITUNG, Marquette, Mich., U.S.A. CABLE ADDRESS, EDBEE. CODES: LIEBER'S, REDPOLL MCNEIL'S, A B C UNIVERSAL COMMERCIAL.

San Francisco Stock Board Sales.

SAN FRANCISCO, Jan. 18, 1900.

9:30 A. M. SESSION.

400 Belcher.....10c	200 Mexican.....31c
100 Challar.....24c	100 Ophir.....67c
100 C. C. & V.$1 40	500 Overman....6c
200 G. & C.....21c	200 Savage.....14c
200 H. & N.....40c	

2:30 P. M. SESSION.

1000 Mexican....32c	700 Challar.....24c
400 B. & B.....23c	200 Y Jacket....22c
100.....22c	150 Potosi.....27c
500 C. C. & V.$1 45	500 Union.....28c

Recently Declared Mining Dividends.

Grand Gulch M. Co., Utah, 1 cent per share, $2400; Jan. 20.

Daly-West M. Co., Utah, 20 cents per share, $30,000; Jan. 20.

Iowa G. M. & M. Co., Silverton, Colo., ½ cent per share, $5000, Jan. 10.

Vindicator Con. G. M. Co., quarterly, 5 cents per share, $50,750; payable Jan. 26.

Alaska-Treadwell M. Co., forty-third dividend, 37½ cents per share, $75,000; payable Jan. 29.

Alaska-Mexican M. Co., twenty-first dividend, 10 cents per share, $18,000; payable Jan. 29.

The following dividends were declared by Utah mines during the first ten days of January: Ontario, $45,000; Mercur, $50,000; Silver King, $75,000; Daly West, $30,000; Swansea, $5000; Mammoth, $40,000. Total, $245,000.

Following is a list of Cripple Creek, Colo., mining dividends during the first ten days of January: Gold Coin, $10,000; Golden Cycle, $10,000; Gold King, $30,000; Last Dollar, $30,000; Lillie, $11,250; Modoc, $5000; Mary McKinnie, $30,000; Portland, $90,000; Raven, $10,000; Strong, $25,000; Vindicator, $50,750; Amazon, $12,000. Total, $314,000.

In Cripple Creek, Colo., on the 15th, the regular dividend of the Portland G. M. Co. for $60,000 and the extra dividend of $30,000 was paid; the Amazon M. Co. paid its first dividend, 2 cents a share, 600,000 shares; the Gold Coin M. & L. Co. declared its January dividend, 1 cent a share; the Vindicator Con. G. M. Co., quarterly, $53,250, dividend is payable Jan. 26; Lillie, Cripple Creek, G. M. Co., $11,367.18, payable Feb. 1; Raven G. M. Co., $10,000, Jan. 20; Gold King M. Co., 3 cents a share, 1,000,000 shares, Jan. 20.

Commercial Paragraphs.

THE Electrical Construction Co. now occupy quarters at 429 Seventeenth St., Denver, Colo.

GILBERT WILKES & CO., mechanical engineers, have opened an office in the E. C. Bldg., Denver, Colo.

FIELD & GOODING have succeeded to the assaying business of W. C. Menger, 1747 Lawrence St., Denver, Colo.

R. N. STEWART has opened an office in Denver for the Crocker Wheeler Co., electrical manufacturers, of New York.

THE Joshua Hendy Machine Works, 38 Fremont St., San Francisco, is now the local agency for the Jackson Drill & Mfg. Co., 1756 Larimer St., Denver, Colo.

DURING the past year the Colorado Iron Works of Denver, Colo., built complete smelting furnaces as follows: Great National Mexican Smelting Company, Monterey, Mexico, 2 lead furnaces 44 in. by 144 in., ordered June 15th; Great National Mexican Smelting Co., Aguascalientas, Mexico, 1 copper furnace 44 in. by 150 in., ordered June 22d; Germania Smelting Works, Salt Lake City, Utah, 1 silver-lead furnace 45 in. by 140 in., ordered July 8th; Val Verde Copper Company, Limited, Prescott, Ariz., 1 copper furnace 42 in. by 120 in., ordered July 31st; Great National Mexican Smelting Company, Monterey, Mexico, 2 lead furnaces 44 in. by 144 in., ordered August 26th; A. Y. Cochrane, Tomichi, Gunnison county, Colo., 1 silver-lead furnace 36 in. by 120 in., ordered Aug. 29th; Omaha & Grant, Denver, 1 silver-lead furnace 36 in. by 133 in., ordered September 18th; United Globe Mines, Globe, Ariz., 1 copper furnace 42 in. by 144 in., ordered September 21st; Vulcan Copper Mining & Smelting Company, Sodaville, Nev., 1 copper furnace 42 in. by 80 in., ordered September 22d; Montana Ore Purchasing Company, Butte, Mont., 2 copper furnaces 40 in. by 120 in., ordered September 27th; Copper King of Arizona, Cochise, Ariz., 1 36 in. circular copper furnace, ordered November 1st; Whipsaw Copper Mining Company, Whipsaw, Ariz., 1 42 in. circular copper-matting furnace, ordered December 7th. This is exclusive of jackets, repairs, etc.

SITUATIONS WANTED.

Experienced Metallurgist and Cyanide Expert desires position. Thorough chemist and assayer. Technical graduate. Speaks Spanish. Capable of taking full charge of gold mill. Salary very reasonable. Address "Millman," this office.

A YOUNG MAN WITH SEVERAL YEARS' practical experience in drift and hydraulic mining, especially hydraulic elevating, is open for engagement to manage or superintend works of this kind. Reference best in the State. Address J., care of Mining and Scientific Press.

MINING ENGINEER WANTS POSITION.

Is a good chemist and metallurgist with thorough practical experience in stamp milling, cyaniding and chlorinating. Recently had charge of stamp mill and cyanide works. Has had excellent experience in examining and reporting on mines, chiefly gold. Speaks Spanish, also French and German; age 30. Moderate salary accepted. Address DENVER, Mining and Scientific Press.

Position Wanted

By Experienced Metallurgist and Mining Engineer, preferable in charge of a cyanide plant or as chemist and assayer. Thoroughly familiar with all processes for gold extraction. Technical graduate. Best of references. Salary moderate. Address W. C. A., care this paper.

WANTED.

Wanted.—Foreman for Twenty-Stamp Mill.

One hundred and fifty dollars per month and board. Address THE WM. HAMILTON MFG. CO., 316 S. Euclid Ave., Oak Park, Illinois.

WANTED.—A STAMP MILL MILLWRIGHT.

Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

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For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

AN OPPORTUNITY

To Double and Treble Your Money.

WRITE FOR PAMPHLET.

COLONIAL COPPER COMPANY,
32 Broadway, N. Y.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St, Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

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——FOR SALE BY——

The Eureka Company,
OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET,
SAN FRANCISCO.

FOR SALE.

FOR SALE.—DIVIDEND-PAYING, HYDRAULIC placer. Extensive deposits. Old channel gravel, water, pressure, grade, dump, and gold. Rigid investigation invited. Thoroughly legitimate. Banking references. Owner. IDAHO, care of Mining and Scientific Press.

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A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.

H. E. RUNKLE, Mining Broker, El Paso, Texas.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.

For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Staloknecht, Durango, Mexico.

A BARGAIN.

3500 feet of 16-inch, 5 B. W. G. National Tube Works seamless pipe. Kimberly joints. Immediate delivery.

Address PIPI, Room No. 140, No. 32 Broadway, New York City.

FOR SALE.

40-lb. Relaying Rails with Plain Plates.
2 Broad Guage Locomotives.

CORRESPONDENCE SOLICITED.

C. J. TALLON,
308 Market Street, San Francisco, Cal.



FOR SALE.

Relaying Rails

For Mines and Street Railways.

LEE CHAMBERLAIN & CO.,
120 North Main St.,
LOS ANGELES.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from J. F. Cowdery, in the Lucky Point Mine, near St. Louis, Sierra Co., to deposit tailings in a worked-out pit; from Chas. S. Diesem, in the Riffle Point Claim, at Grass Flat, Sierra Co., to deposit tailings in Grass Flat Ravine; from Morris J. Williams, in the Weeds Point Mine, near Camptonville, Yuba Co., to deposit tailings in a ravine; and from E. A. Moody, in the Inskip Placer Mine, at Gold Run, Placer Co., to deposit tailings in Squires Ravine, gives notice that a meeting will be held at Room 58, Flood Building, San Francisco, Cal., on January 29, 1900, at 1:30 P. M.

AIR COMPRESSORS, Catalogues.
Rock Drills,
Coal Cutters,
Lift Pump, Pohle and Stone Channelers.

The **INGERSOLL-SERGEANT Drill Co.,**
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San Francisco Agents, PARKE & LACY CO., 203 Fremont Street.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

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ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

"SMOOTH ON" CASTINGS.

An iron cement in powdered form, for repairing leaks or fractures in steam or hydraulic work, applied by mixing with water; hardens quickly and expands in hardening. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,

34-36 STEUART ST., SAN FRANCISCO, CAL.....AGENTS FOR PACIFIC COAST.

MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**

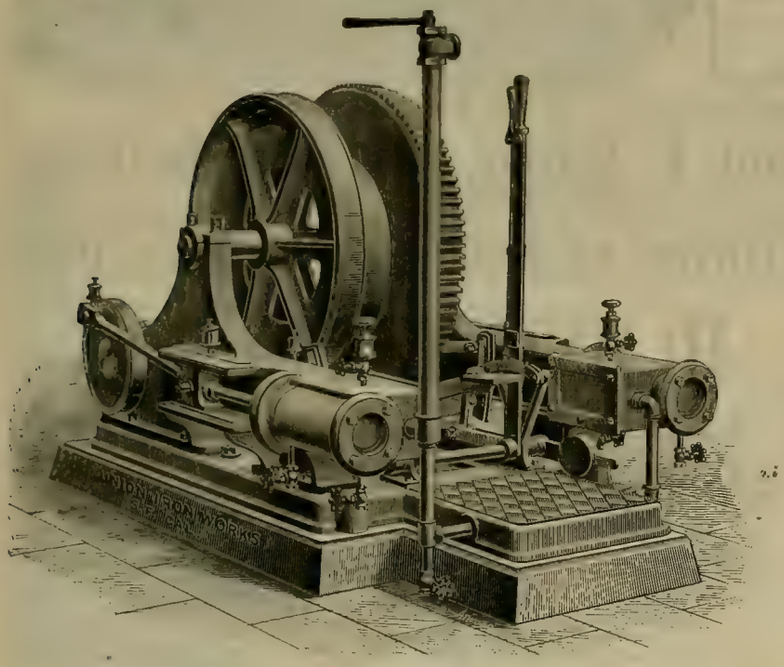
MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.

MAKE THIS SMALL

DOUBLE CYLINDER SINGLE DRUM HOIST



HOIST FOR PROSPECTING.

For Prospecting Purposes or Underground Work,

USING COMPRESSED AIR.

The entire hoist is self-contained, being mounted on an iron sole plate or bed which carries all the operating levers and provides a footboard for the operator. The engines are provided with reversible link motion and the drum with a broad strap brake, insuring safe and rapid work.

The general lines upon which this hoist is designed are neat, strong and substantial and all the operating parts are conveniently arranged.

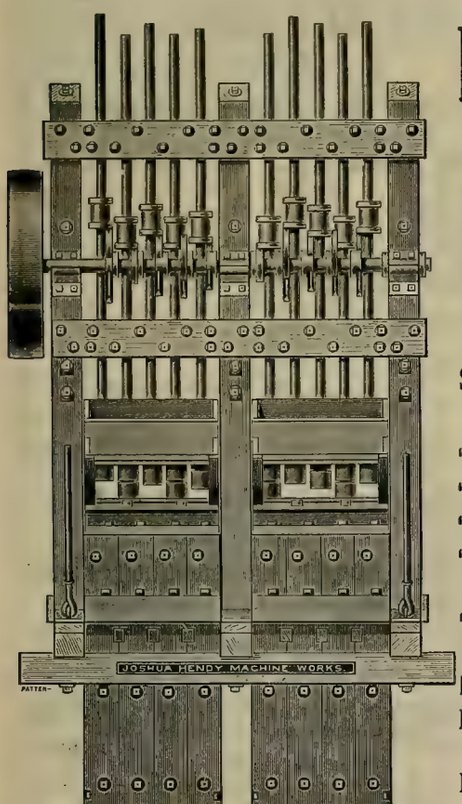
The size herewith illustrated is the 4 in. x 10 in., rated at 15 horse power. The larger sizes, 8 in. x 12 in. and upwards are provided with post brakes.

Joshua Hendy Machine Works,

San Francisco, Cal.

Office and Salesroom.....38 to 44 Fremont Street.

Works.....Cors. Bay, Kearny and Francisco Streets.



10-STAMP BATTERY.

MINING AND MILLING MACHINERY.

Stamp Mills;

"Hercules" Ore Crushers;
"Challenge" Ore Feeders;
"Triumph" Ore Concentrators;
"Hendy-Norbom" Ore Concentrators;
"Triple Discharge" Two Stamp Mills;
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Hoisting, Pumping and Irrigating Plants;
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WILFLEY CONCENTRATOR.



The Wilfley Table is fully covered by U. S. patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

PRICE, $450, F. O. B., San Francisco.

Some Practical Reasons Why the Wilfley Concentrator Should Be Used in Gold Mills:

One of these machines will take the place of two or three belt concentrators of any style and do very much better work. Easy adjustment. Little wear.

1. It will successfully handle three or four times more material than any belt Concentrator made, without exception.
2. It will save more sulphurets in proportion while so doing, and catch any float gold, amalgam or quicksilver which may escape from mortars or plates.
3. It will make cleaner and much more valuable concentrates, thus saving useless expense for transporting valueless material, as also extra cost for treatment.
4. It requires little or no attention when once adjusted and no expert is required to either adjust or run the machine.
5. It will save much expense in power and room, and the first cost of a mill requiring concentrators.
6. It has no expensive belts to crack and wear out, nor complicated machinery to keep in repair.
7. It is the only sensible plan of concentration, as any kind of material can be worked, which is not true of any style of belt machine.

SEND FOR CIRCULARS.

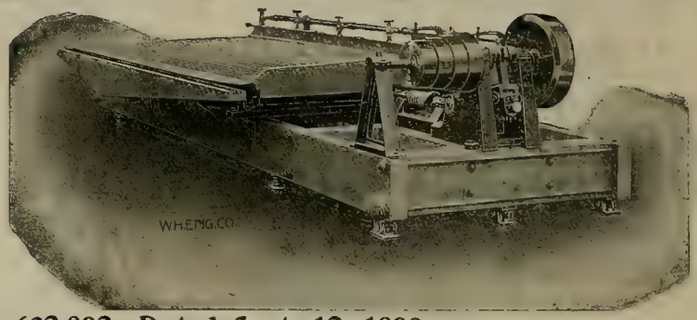
These Machines are Kept in Stock Ready for Immediate Shipment.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

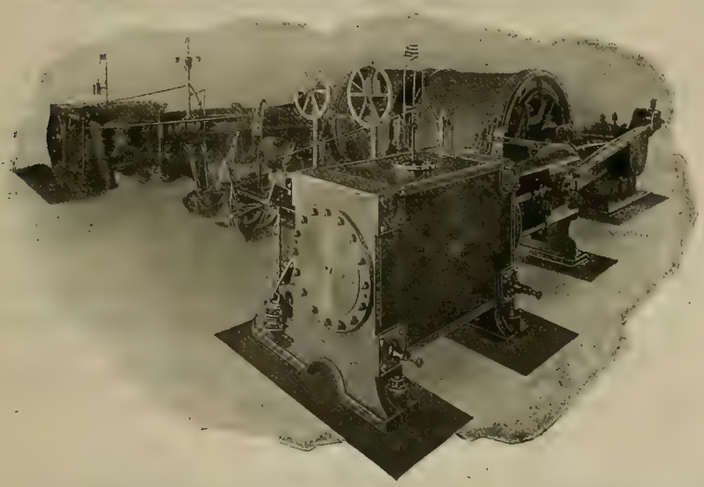
We have reports from mills employing Cammett concentrators for the treatment of ores containing galena, iron sulphide and zinc blende, that they are regularly producing on each table three distinct concentrates—one of galena, one of iron sulphide and one of zinc blende, each of which is commercially clean.

Practical experience with the Cammett concentrator proves that it **saves** and **delivers** into the **concentrates box** slimes so fine that to prevent them from being lost from the **concentrates box** it is necessary to provide several additional overflow tanks.



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

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30th and Blake Streets, - - - - DENVER, COLORADO.



HIGH CLASS FIRST MOTION
HOISTING ENGINES

Especially Designed

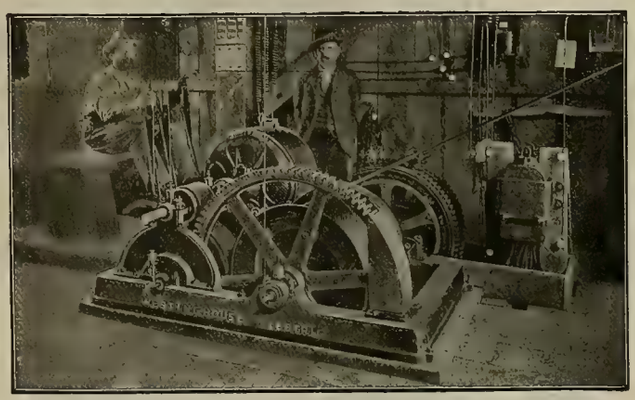
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Built with **CORLISS OR SLIDE VALVE ENGINES** and for either **ROUND OR FLAT ROPE.**

Our line of Hoisting Machinery is the most complete carried by any one concern in the United States. Write us of your wants.

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No. 35.



INDUCTION MOTOR OPERATING MINE HOIST.

Mine Hoists.

Operated by direct or alternating current motors.

Westinghouse Electric & Mfg. Co.,
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51-F

THE MARION STEAM SHOVEL CO.,



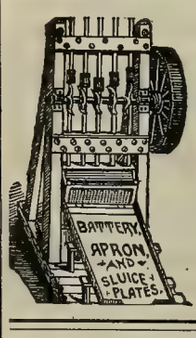
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Dredges and
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Suitable for all kinds of **Excavating Work**, making a specialty of

PLACER MINING MACHINES,
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Silver Plated Copper Amalgamating Plates
For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

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Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

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Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.



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ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

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MALLEABLE IRON BUCKETS, Electric Coal Mining and Haulage Machinery, Luhrig Patent Machinery for Washing and Classifying Coal, Shafting, Pulleys, Bearing Rope Sheaves, Clutches, Etc.

Machinery designed and erected to suit existing conditions and available space.

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ROBINS BELT CONVEYORS

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Cut shows conveyor elevating and distributing coal in storage.

New Catalogue Now Ready.

ROBINS CONVEYING BELT CO.,
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Mining, Mill, Driving Lamps —AND— Locomotive Headlights.

SIZES ON HAND:
24-inch,
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Mining Machinery.

Stamp Mills

Of the Latest Improved Design for

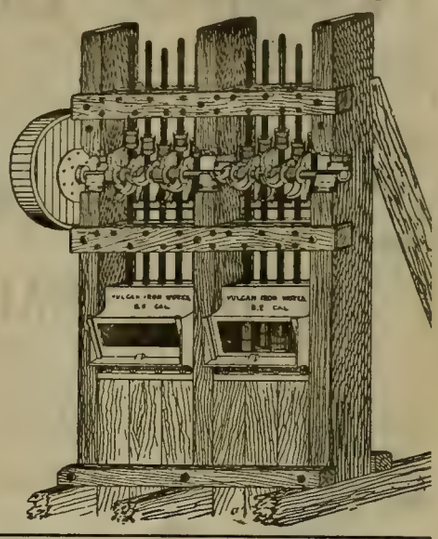
Gold Milling.

VULCAN WIRE ROPEWAYS

For Conveying Ore, Etc.

Vulcan Iron Works,

Office: 505 Mission Street, San Francisco, Cal.

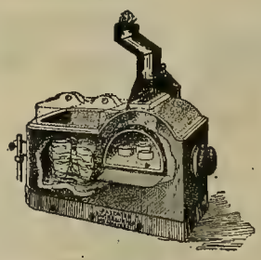


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The walls of a house are built for protection. If the sun and weather open up the sheathing, the rain or the air will get in and cause discomfort and doctor's bills. To prevent this the architect or builder uses building paper. There are many kinds, but only two classes—the poor and the good. P & B PAPER is good—the best. It is very strong, odorless, waterproof and airproof, and will not rot. Ask your dealer for samples, or write us for them. We are the makers.

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Assayers' Gasoline Furnaces.



This illustration shows L. & C. Combination Furnace melting and cupelling simultaneously with one burner.

L. & C. COMBINATION MELTING AND MUFFLE FURNACES

(Shown in illustration)

ARE ECONOMICAL, CONVENIENT AND EFFICIENT.

SEND FOR DESCRIPTIVE PAMPHLET.

Manufactured by.....

F. W. BRAUN & CO.,
DEALERS IN ASSAYERS' SUPPLIES,
M'F'R'S CALKINS' CUPEL MACHINES,
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JOHN WIGMORE & SONS CO.

WE ARE AGENTS FOR

Dow Steam Pumps,
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STRICTLY C. P. ACIDS and C. P. AMMONIA

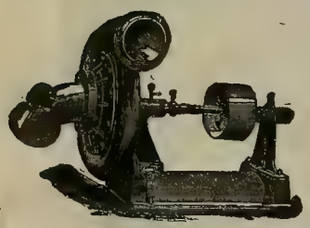
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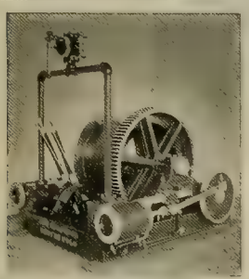


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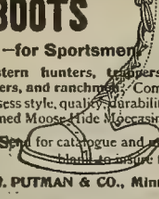
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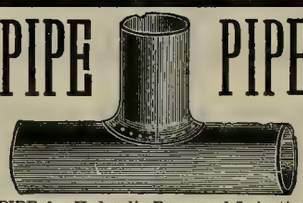
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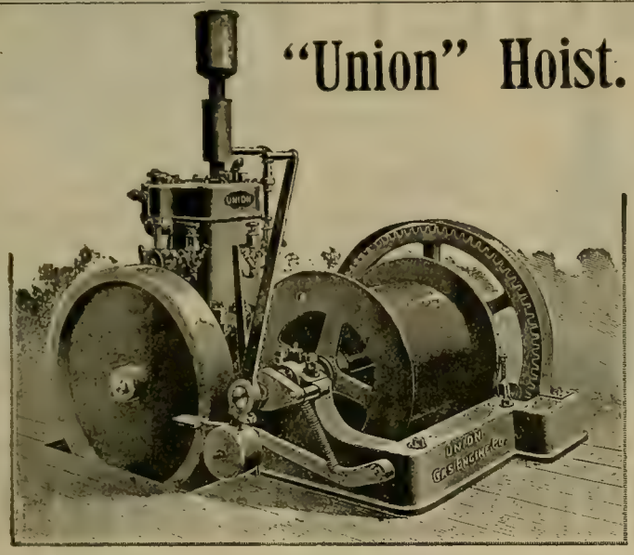
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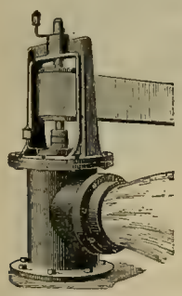
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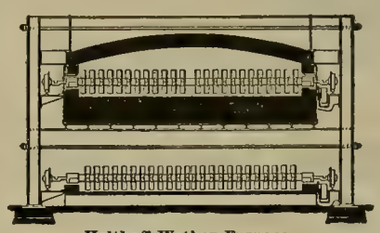
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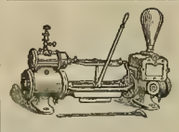
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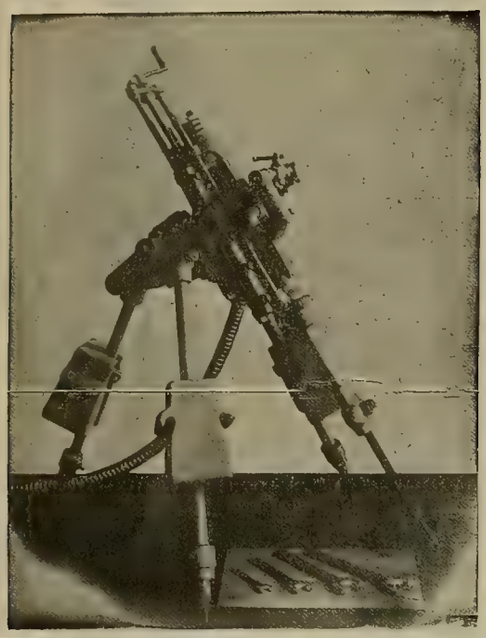
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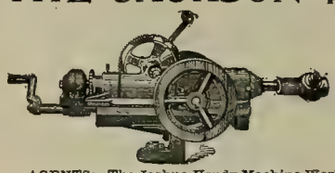
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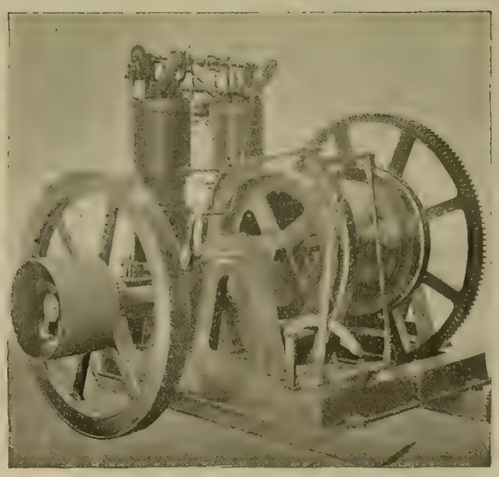
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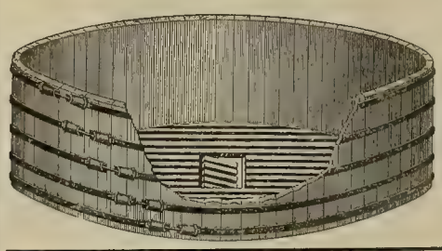
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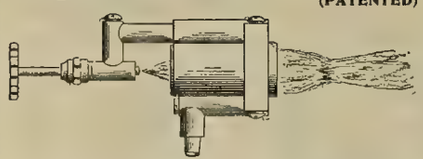
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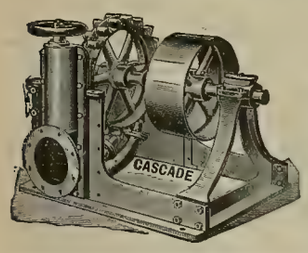
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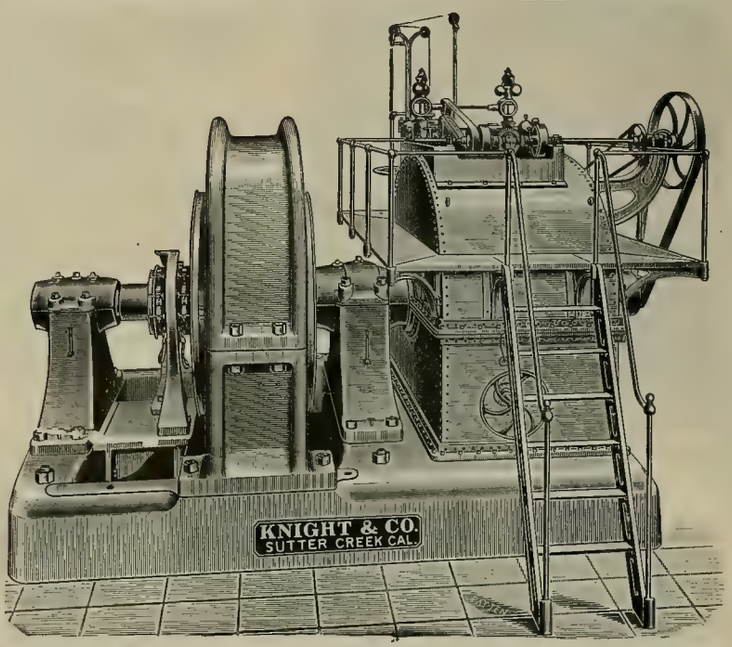


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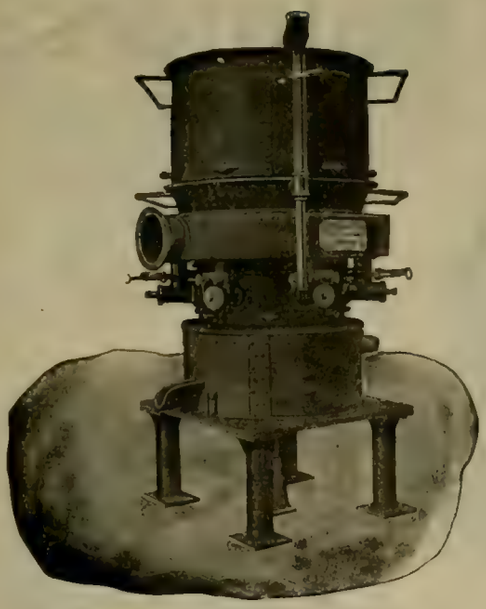
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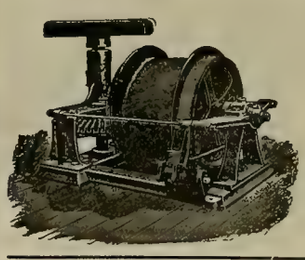
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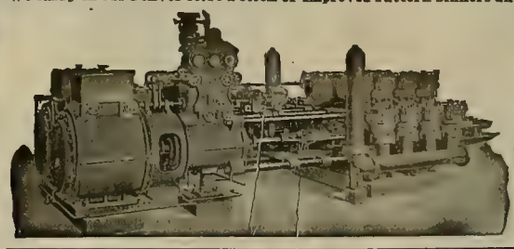
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EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of December, 1899, an assessment (No. 22) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 27th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 22) has been postponed to THURSDAY, the 25th day of January, 1900 and the day of sale from the 27th day of January, 1900, to SATURDAY, the 10th day of February, 1900.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office, Room 31, No. 214 Pine street, San Francisco, California.

SOUTH PALOMA GOLD MINING COMPANY, Limited.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Directors, held on the 6th day of December, 1899, an assessment (No. 1) of six-tenths (6-10) of a cent per share was levied upon the capital stock of the corporation, payable immediately to the secretary, John F. Barnett, at Room 22, No. 222 Sansome St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3rd day of February, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on the 19th day of February, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

JOHN F. BARNETT, Secretary.

Room 22, No. 222 Sansome St., San Francisco, Cal.

QUINCY MINING AND WATER COMPANY.—Location of principal place of business, San Francisco, California; location of works, Spanish Ranch, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of January, 1900, an assessment (No. 2) of forty cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 439 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of February, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 5th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

THOMAS QUIGLEY, Secretary.

Office—No. 439 California street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of January, 1900, an assessment (No. 10) of five cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of February, 1900, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 5th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

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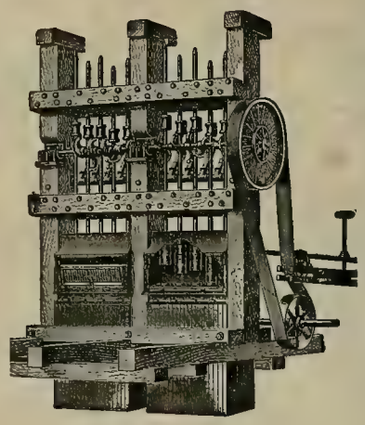


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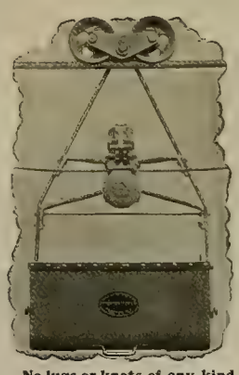
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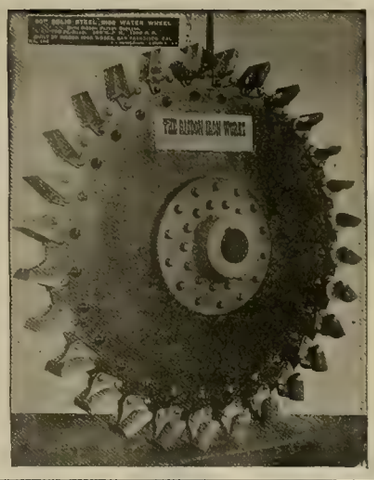
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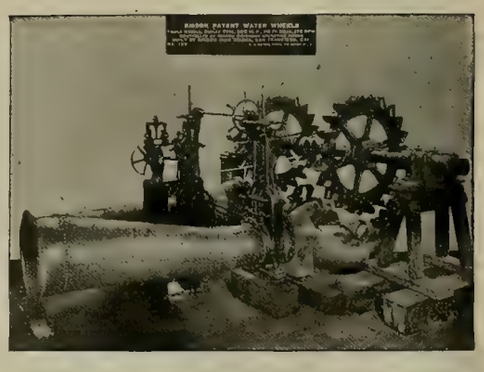
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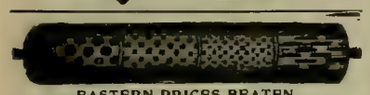
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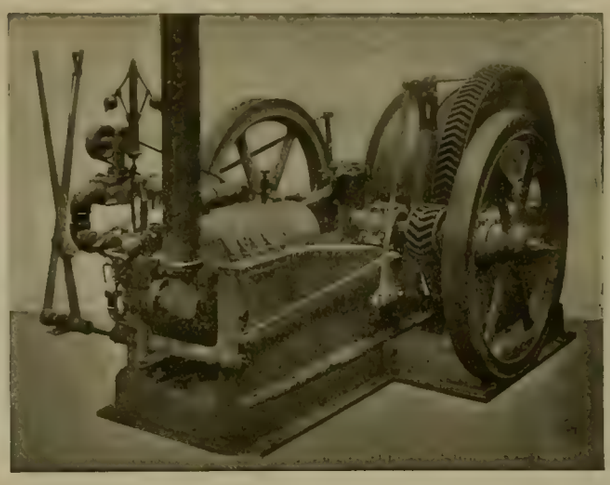
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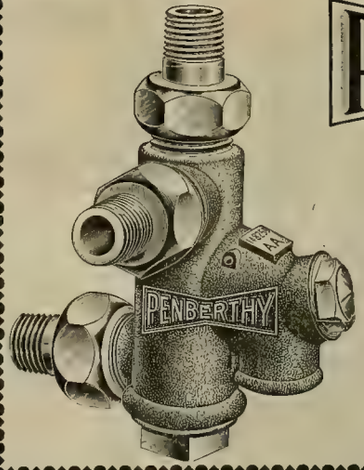
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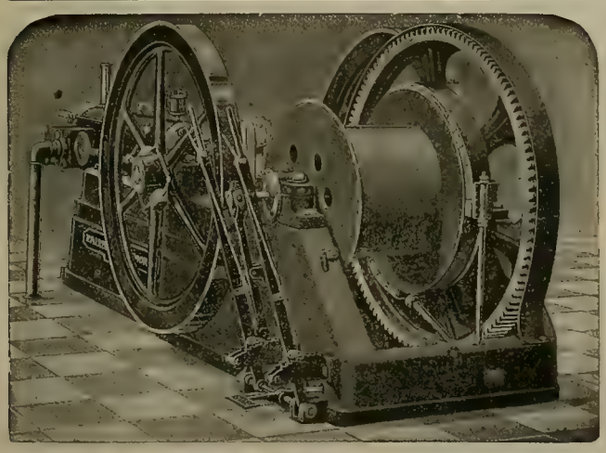


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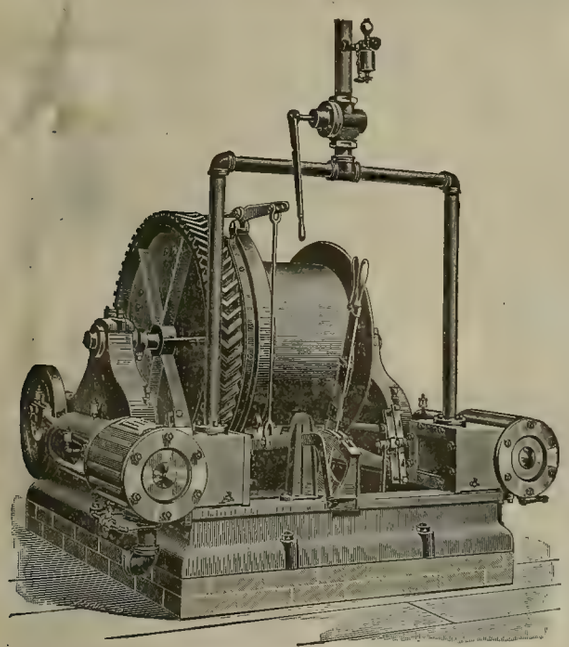
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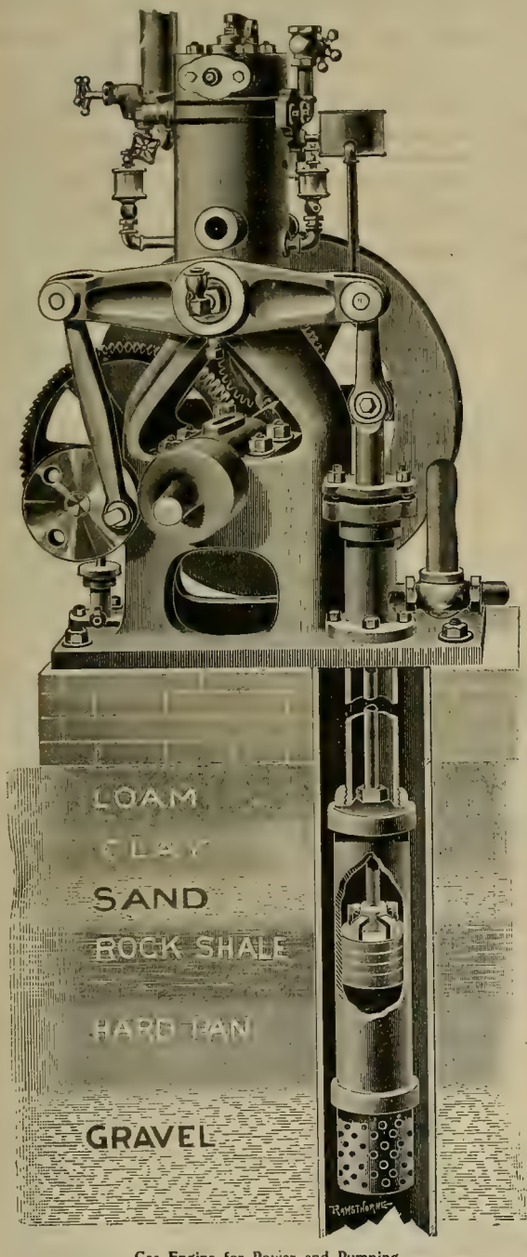
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No. 2064. — VOLUME LXXX. Number 4. SAN FRANCISCO, SATURDAY, JANUARY 27, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Gas Engines for Power and Pumping.

Small and compact gas or gasoline engines for pumping have an increasing demand. The accompanying illustration shows one with pumping attachment, for pumping water from deep wells and elevating to tanks any desired height above the well. This engine is made in two sizes, 1½ and 3 H. P. The base of the 3 H. P. occupies a floor space of 17x33 inches, and the pump tubing is attached to the base near one corner. The pump is operated by a walking beam attached to one side of the cylinder. The power is taken from a small pinion on the main shaft to a large cog wheel on another parallel shaft with friction disks. The pump can be started and stopped while the engine is in motion. Two balanced wheels go with each engine, but only one is shown in the cut.



Gas Engine for Power and Pumping.

The material used in the make of the engines is forged steel shafts, cut gears and bronze bearings. About 25 feet per hour of gas, or its equivalent in gasoline, will run size No. 1, and about double that quantity will operate size No. 2 to its full capacity. Ignition is caused by means of an incandescent tube. The cylinder is water jacketed and provided with sight feed lubricators. When using gasoline it is safely stored in a barrel or tank outside of the building, at any desired distance, and may be placed in a pit in the ground. The amount of water pumped will depend on the distance it is to be elevated. In a general way, size No. 2 (3 H. P.) will lift 5000 to 10,000 gallons per day of ten hours from a well 200 feet deep, and elevate it 50 to 100 feet higher to a storage tank or reservoir. In addition to pumping the engine can be used for running light machinery which can be driven by a belt.

Placing a Hand Pump.

When calculating to place a hand pump trust nothing to suction; place the cylinder far enough above the bottom to insure prompt action of the valves, and near enough to the water to avoid the necessity of an absolutely perfect airtight piston, except as the water shall make it so. For wells of depths greater than 15 feet, place the cylinder within 12 feet of the bottom and let the pipe extend, with a foot valve on end, to within 6 or 8 inches of the bottom. The friction in pipes is as the square of velocity: velocity increases as the squares of the diameters. It is poor economy to try to make a small pump do the work of a large one by crowding it. The velocity of a given volume of water flowing through a 2-inch pipe would be increased four times if made to flow through a 1-inch pipe; the friction would be increased sixteen times, which shows the advantage of using large pipes.



Palmer Mountain, Wash., Tunnel Dump, Compressor and Buildings.
(See page 99.)



Palmer Mountain, Wash., from the Southwest; Town of Loomis at Base.
(See page 99.)



Portal of Palmer Mountain Tunnel, State of Washington; in 2614 Feet Dec. 17, '99; Depth Gained, 1200 Feet. (See page 99.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Office, No. 330 Market Street, San Francisco, Cal.

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J. F. HALLORAN.....Publisher.

San Francisco, January 27, 1900.

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NEARLY every great structure in San Francisco was erected with money made by miners. Nevada and California miners have practically built up San Francisco, and the great stream of California mineral wealth still steadily pours into the metropolis. One sees little of such manifestation of other forms of State development compared to the manifestation of solid wealth from the mines. Gold is the one commodity that is not controlled by corporate or freight conditions, that is of constant value at a constant price, that is sought by the purchaser, is not subject to competition and is constantly under the control of the producer till marketed.

BUTTE, MONTANA, wants a mining and stock exchange. It cites other mining communities, of, no greater producing powers than Butte, where such institutions exist, and thinks Butte brokers might as well have the daily handling of thousands of dollars as members of the Boston Exchange. It is argued that a local exchange would tend to keep the money in Montana and develop native resources. Some day Butte may also conclude that it would be more financially economical to establish great manufacturing establishments to work up the "raw material," as they call the copper ingots in the East, though to a Montana miner such commodity has much the appearance of a finished product.

WHAT this paper has so often suggested regarding the necessity for practical knowledge in mining work is well exemplified in a little special correspondence from Silver City, New Mexico, on page 99. It is brief, but tells the whole story. A mining property had been handled by men who were not acquainted with their business, development work had not been done right, and immense expenditure in top-heavy management and surface salaries had discouraged the men who were putting up the money, with the result that work was shut down and that part of the district got the customary "black-eye." Two or three miners—plain, ordinary, every-day miners, the kind of men who don't know it all, but have a middling fair idea of what is necessary in such a matter—took hold, put up $12,000, ran things intelligently and economically, and in eight months, on a $12,000 investment, cleared $60,000 net profit. The difference is in the know how. The men who first had hold would doubtless say "No" were they asked, "Does mining pay?" The three miners would as certainly say "Yes." Mining—real mining—intelligent, economical, business-like mining, will pay; but it is in mining, as in any other legitimate business, where ignorance is expensive, and a man must know what he is doing and have some good reason for paying out money, or he will quit loser.

As to Selling a Mine.

It is not easy to sell a mine, largely because of methods of mine owners. Most "mines" are unproductive; they have to be made; they are more than a "prospect," but not developed enough to be really deserving of the name "mine." Those mines, or rather their owners, must give inducement to capital, and while occasionally a man or a corporation is fooled into buying a "mine" that isn't much more than a prospect and paying the price of a "going" mine for it, such a transaction is about the worst thing that can happen a district, for it is sure to be found out, to the irretrievable injury of that whole region. The most common mistake on the part of the mine owner, provided he wants to sell, is to set too high a price on his property. The would-be buyer can get along without him better than he can get along without the purchaser, and while a man is justified in getting all that a thing is worth, he overreaches and spoils a sale by exorbitant or impossible requirements at the outset. It is also to be remembered that mines are now rarely bought by individuals and, still rarer, so developed to any great extent. It is in mining as in everything else, the day of aggregation of capital, and twenty men's money will go into projects that one man's money could not touch or wouldn't risk. This paragraph is inspired by a recent talk with a mine owner who has a really good property and that by the investment of $30,000 or $40,000 could in all probability be made a paying mine. He said, in conversation with the writer, that he had just refused $25,000 for it. When asked why, he said: "Well, if it's worth $25,000 to ——, it's worth that to me." But it isn't. Right there is his mistake. He has lived, or rather existed, alongside that claim half his life—the best of his years; he had a chance to get something he never had before—$25,000, a comfortable little sum, at once. But he said: "—— would have sold it to a company for $50,000. Do you suppose I'd let my mine go for $25,000? Not much." He will live and die right by his mine and never have one-tenth of $25,000 at one time, just because he thinks that if it is worth a certain sum to a man who can control or secure capital to make a mine of it, it is worth that much to him in its undeveloped state. It's hard enough to sell a mine without allowing such absurd notions to overshadow one's business judgment. "But," it may be asked, "you wouldn't advise a man to sell a property for $25,000 when he knows it is worth a great deal more, and that the buyer will make two or three times over on the purchase?" A man should always do the best he can. If he has "go" enough about him to enlist capital and develop his property and make a mine of it worth $150,000, he were foolish to let any promoter or middleman or anybody else get his property from him for less than its proved worth, but if he has been trying to do that for twenty years and finds he isn't able, he is more foolish to refuse $25,000 offered him by some one else for the chance that he has never been able to have tested: $25,000 beats nothing, and nothing is what this particular man has had and, we fear, will have. Of course it is a good joke on a "promoter" or a responsible man with a proffer to ask an impossible price and freeze him out of the place, but, somehow, the joke is oftenest on the one who does that. The would-be purchaser can go elsewhere, and the man whose property is worth as much to him as it is to any one else can keep right on owning it and camping alongside of it till he is old and forgotten.

A Mistake of Terms.

An inventor makes a claim of remarkable merits for superheated water for light and heavy transportation. He says: "The water is heated in upright steel tubes to 150° above temperature of steam in a locomotive. When released into an engine it expands nearly 1000 times and performs the services required of a storage power." This is a mistake. Water cannot be superheated. Superheating means a greater heat than is due to the pressure of evaporation, and is not applied to liquids. Vapors or steam may be superheated or given a higher temperature than is due to their evaporative pressure. A full boiler may be heated to any reasonable degree of temperature above 212° F., but is subject to the steam pressure due to the temperature, as well also the enormous pressure of the expansion of the water, which no boiler can resist. In all boilers making steam under pressure the water is at or very near the temperature of the steam; at 100 lbs. pressure the temperature is about 338° F. Hot water circulating pipes have been in use with a water temperature from 500° to 600° F., but the pressure was in proportion to the temperature.

A New Ruling.

The Secretary of the Interior has reversed existing rulings of the Commissioner of the General Land Office in a matter of general importance to miners. It concerns applications for mining patents. The General Land Office has all along held that where a corner of an adjoining agricultural claim cuts into a mining claim, patent for the latter could not be secured in its entirety where a portion had previously been patented as agricultural. The Secretary of the Interior reverses this ruling. The case came up from Coulterville, Mariposa Co., Cal. In '84 two men made a lode location. In '86 another man made homestead entry adjoining, and one corner of his claim, 4.63 acres, conflicted with the mining claim and overlapped the lode line. This latter claimant made final proof of his homestead entry and patent was issued in '92. In '95 a San Francisco company bought the mining claim and in '97 made application for patent to it as a whole, including that part previously patented to the agricultural claimant. The latter gave a quit claim deed of the 4.63 acres to the miners and this was filed with their application for patent. The application was refused by the Commissioner of the General Land Office, and, upon appeal, has been allowed by the Secretary of the Interior, whose argument is that when the agricultural claimant made his homestead entry and submitted final proof thereon, in connection with both of which he represented that the land embraced therein was non-mineral and contained no mining claim or known ledge or vein bearing valuable mineral deposits, the ground in conflict was known to be mineral land and was not subject to homestead entry. Under these circumstances the United States could successfully maintain a suit to vacate the patent to the extent of the ground in conflict, and when such a suit can be maintained the United States may accept a reconveyance of the ground for which a patent was thus wrongfully obtained, thus accomplishing by voluntary act of the parties all that would be accomplished by a suit in court. Such a reconveyance having been made, the Land Department is authorized to issue a patent to the mineral claimant for the ground in question.

A Third System of River Channels.

In this issue appears the first part of an article on gold dredging, the latest form of American gold mining. Reference is here made to it because of its progressive character, and because so much is yet to be learned about it. When first begun it was supposed that only in the beds of streams, or along the meanders of their course, could be found suitable or profitable dredging ground. A Butte county, Cal., operator states that it is now evident that in connection with river dredging for gold there exist modified conditions similar in general to those appertaining to drift mining, a form of mining peculiar to California. In drift mining the gold gravel is found in the beds of ancient river channels—old streams that æons of centuries ago coursed at right angles to the rivers of to-day. These prehistoric water courses are capped with lava. In similar manner, but far more recent, and covered with clay and silt, instead of indurated lava, is argued that in less remote geological periods there was a third and hitherto unknown direction of California water courses, and by diligent prospecting suitable dredging ground may now be found at almost right angles to the present bed of the stream, along the course of streams less ancient than the lava-capped channel of the drift miner, but remotely antedating the present geologic period. The California miner referred to, after considerable practical research, is of the opinion that when this matter, which is advancing from a theory to a demonstrated fact, is thoroughly shown to be so, the area of California dredging ground will be greatly extended, and along the former courses of present streams will be found profitable employment for these latest gold mining devices.

Concentrates.

SULPHUR in plenty is found in Nevada, Utah, Lower California, Texas and Louisiana.

THE Yuba, Cal., Electric Power Co.'s experience with aluminum wire has not been wholly satisfactory.

THE relative electric conductivity of aluminum as compared with copper is as .56 to 1.

EQUAL parts of carbolic acid and olive oil smeared over polished steel will preserve its brightness in any climate.

THE volumes of spheres vary as the cubes of their diameters.

THERE is an aluminum telephone system in operation between Pittsburg and New Kensington, Pa., eighteen miles.

THE face side of a rubber belt should be next the pulley; it gives a better contact and is less liable to slip and wear at the lap seam.

A ROUND steel bar, 3½ inches diameter, will weigh 2½ pounds per inch of length: if 7 inches diameter 10.93 pounds per running inch.

ANTHROPOGEOGRAPHY means that branch of geography which treats of the earth in its relation to man—a large circle of science and knowledge.

NO biennial report has been issued by the California State Mining Bureau for some years. The latest was by State Mineralogist Crawford, in 1896.

CALIFORNIA gold dredging is a profitable form of gold mining. The Feather river dredgers near Oroville are credited with a daily profit each of from $100 to $150.

LIQUID chlorine may be bought from John Taylor & Co., 63 First St., San Francisco, the Western Chemical Co., Denver, Colo., or Roessler & Hasslacher, N. Y. City.

FRENCH capital invested in mining has mostly been in Russia and South Africa, a little being done in that direction in California, the latter being uniformly profitable.

SO FAR as known, the first steam quartz stamp mill in California was put up by Wm. Irvine in March, '52, one and one-half miles north of El Dorado, south of the Mokelumne river.

THE noticed fluidity of metals below their melting points may be explained on the hypothesis or assumption that the molecules of solids, like those of fluids, have not all the same velocity.

WHITE LEAD of good quality is manufactured electrolytically. Acetic acid is not used. The lead is acted upon with nitric acid generated by electricity, and the operation is swift and automatic.

THIS paper, in bound volume, will be found at the Paris Exposition in its appropriate place. At the Chicago Exposition, '93, it was the only journal of the kind that received the special award designated.

THE American Smelting & Refining Co., during the week ending the 13th inst., deposited in the United States mints 28,369 ounces gold, valued at $586,424, and exported 807,948 ounces silver, valued at $476,689, a total of $1,063,113.

ANDORITE is an unusual ore of silver, occurring in short prismatic crystals, metallic luster, dark lead or steel gray color, blending to black. It contains: sulphur, 23.32%; antimony, 41.91%; lead, 22.07%; silver, 11.31%; copper, 0.69%; zinc manganese, 0.7%.

ANY advantage of using cyanogen bromide is probably due to its acting as a storage of cyanogen that can be drawn upon as needed by the dissolving gold, and that it can be added in just the quantity required. Further, it seems to have no decomposing action on the potassium cyanide.

IT is unfair to Tuolumne Co., Cal., to speak of it as a "pocket county." There is or was a pocket region in that county, but it is nearly worked out, and, meanwhile, rich milling mines have been developed that compare favorably in output and profit with any other mines in California.

TWENTY-FOUR carat gold is pure gold; 22 carat gold has 22 parts of gold, 1 of silver and 1 of copper; 18 carat gold has 18 parts of pure gold and 3 parts each of silver and copper in its composition; 12 carat gold is half gold, the remainder being made up of 3½ parts of silver and 8½ parts copper.

THE South African war has checked the demand there for American mining machinery, but the great local demand continues to tax the ability of manufacturers to keep up with orders. One who wants a special plant of any magnitude should not expect it for six months after the receipt of order.

THIS paper constantly solicits from practical mining men everywhere accounts of their mining, milling or other daily experience or operation. Being the recognized medium of exchange among miners of such practical experience, in no way can a wider or more appreciative audience be secured.

GOOD mill and concentration work is done at several leading California mines. Concentration of auriferous sulphides at the Kennedy mine, Amador county, may be cited as of high excellence. At the W. Y. O. D., in Nevada county, gold ore is treated for less than $6 per ton. The latter mine is credited with clearing over $60,000 in '99.

THE most expensive manufactured product in the world is charcoal thread, used for incandescent lamps. It is manufactured in France and sold by the gramme—15½ grains. Reducing its price to the basis of pounds, it appears that the filaments for lamps of twenty candles are worth $8000 per pound. They have a diameter of 0.0394 in.; it would take about 1,000,000 of them to weigh a pound.

AN engineer who read the remarks in last week's "Concentrates" about a thumping engine says that often when an engine pounds, apparently for no reason, if it is given just a little more compression, the thumping will either stop entirely or get worse. If the latter, then another change in the valve and a little less compression does the business. A change seems what is needed, the compression being too much or too little to let the engine slip smoothly over the center.

AS SOUTHERN and central California has State mine examiners, northern California thinks it is entitled to similar consideration. Accordingly the Shasta County Board of Supervisors has adopted a resolution asking the Governor to apportion one-fifth of the $20,000 appropriation to scientific mining examination to Shasta, Siskiyou and Trinity counties. The Supervisors of the two latter counties propose to adopt similar resolutions. These three counties in '99 produced a large part of the State's mineral output.

THE Montana Mineral Lands Commission works very well. So would the California Mineral Lands Commission, had corporate influence and local apathy not succeeded in nullifying honest effort to secure the passage of the measure that this paper originated and so long and strenuously advocated. So many other matters claim the attention of a journal like this that it is impossible to more than briefly allude to this matter, but those interested will find a full history of the movement in the volumes from '94 to date.

SO MUCH that is new and necessary awaits weekly answer in "Concentrates" that it is not deemed advisable to repeat information recently given. By consulting the indices of previous volumes, it is often easy for the inquirer himself to find an answer to a common question. In this case, however, it is again stated that on a mining claim located in 1900 the locator has until Dec. 31st, 1901, to do the necessary $100 assessment work; but any work done in 1900, much or little, will not count for 1901. Whatever work is done this year, $100 additional must be done next year to legally hold the claim.

DRILLS for granite for best effect should have their cutting edge at an angle of 75°, and if a single blade, should have the point a little one side of the center. By this shape the side thrust of the drill gives it a clearance and prevents sticking. Careful and slow heating to as low a heat as will allow the particular brand of steel to harden is desirable. Harden in salt water: one quart of salt to a pail of water. Some tool sharpeners add two ounces of yellow prussiate of potash to the pail of salt water. The principal aim should be to work the steel at a low red heat, avoid burning the corners, and not draw the temper.

NEAR Argostoli, on the coast of the Greek island of Cephalonia, there are currents of water, coming from the sea, and disappearing in the land, without visible return, which are so strong and constant that they were long used for driving the undershot water wheels of flouring mills. This use has been discontinued in recent years, by reason of the erection in the region of large modern mills, which have rendered unprofitable not only the small and rude sea mills, but also the once numerous windmills of the island. But the sea currents still continue to flow with unabated force and volume. The daily amount of water thus disappearing in the porous and fissured limestone is estimated at approximately 6,000,000 cubic feet.

THE tensile resistance of various wires is ascertained by practical experiments conducted in testing machines, which usually indicate the result in pounds. In construction and action they are similar to cement and other metal-testing appliances. The specimen is secured in a fixed jaw or clamp, the opposite end being grasped by a similar device, connected with a graduated lever, provided with a movable weight. Mechanism is also used for indicating the number of twists or bends a sample of wire will withstand in a given length without breaking or fracturing. The usual twisting tests are applied to samples 6 or 8 inches long. Good qualities of crucible steel wire of correct temper should give an average of forty turns in a length equal to 100 times its gauge or diameter without rupture.

THERE are several methods of closing cracks in cast iron. A rapid and certain way is as follows: The leaking metallic cylinder is filled with a certain quantity of perchloride of iron, the liquid compressed until globules appear on the external surface. The cylinder is then impregnated with perchloride of iron right through, as regards its thickness. Any perchloride in the cylinder is then emptied out, and filled with ammonia at 22° B., this being also subjected to compression. The perchloride of iron in the metal is thus transformed into hydrated oxide of iron, first frothy, but soon by pressure becoming rough and compact. Some hydro-chlorate of ammonia remains, which soon reacts on the iron, and is eventually converted into an oxide compound, adding itself to the first. The leaks noted at the beginning of the operation stop when the ammonia moves out externally.

CAST IRON weighs 444 pounds to the cubic foot; a 1 inch square bar will sustain a weight of 16,500 pounds; bronze, weight 525 pounds, tenacity 36,000; wrought iron, weight 480, tenacity 50,000; hard "struck" steel, weight 490, tenacity 78,000; aluminum, weight 168, tenacity 26,000. One is accustomed to think of metals being stronger than wood, and so they are, generally speaking, if only pieces of the same size be tested. But let equal weights of the two materials be compared, and it will then be found that several varieties of wood will prove stouter than ordinary steel. A bar of pine just as heavy as a bar of steel 1 inch square will hold up 125,000 pounds, the best ash 175,000 and some hemlock 200,000 pounds. Wood is bulky, occupying ten or twelve times the space of steel.

IN the electrolytic extraction of quicksilver, the cinnabar is crushed fine and treated with a hot solution of sodium-sulphide containing caustic soda. The electrolytic vats are iron, and may be used as cathodes; the anodes of sheet steel. The mercury can be separated from the upper part of the cell, and is enriched with equivalent amounts of copper, silver, zinc, cadmium, nickel, and iron in the lower or anodic compartment of the cell. The solution on issuing from the cell is passed through a series of vessels, in which the silver is displaced by copper by chemical action. Copper equal to about one-fourteenth of the weight of the alloy used has to be consumed in these to affect precipitation. It is not possible to remove the last traces of silver by this method, but the amount found in the deposited copper should not exceed 0.3% when the process is working satisfactorily. After passing through a series of the sulphide solution, by using a current density of 0.5–0.8 ampere per square decimeter and an E. M. F. of two volts the electrolyte can be used again for extracting fresh ore after addition of sulphur.

THE latest report of the Alaska-Treadwell Gold Mining Co. is for the year ending May 31, 1899. For that period Supt. Corbus reports that there were 250,408 tons ore mined and milled at a cost of $193,637.99, or $0.773 per ton. That amount of ore was crushed at the 240-stamp mill at a cost of $69,571.67, or $0.2776 per ton; in the mill steam power was used 111½ days, and water power 241¾ days. There was an average crushing of 710 tons per day, or a trifle less than three tons per stamp per day. The new 300-stamp mill began May 6. It is on the beach adjoining the chlorination works. Each stamp weighs 1050 lbs. In this mill there are no concentrators. The mill is valued in place at $326,310.24. Chlorination of 3,196.6 tons of sulphurets cost $16,927.82. The gold yield per ton of the 250,408 tons of ore mined and milled was $2.71; the cost of operation was $1.28 per ton, leaving a profit of $1.43 per ton. Work began at that mine in '82. The gold yield per ton has varied from $4.40 per ton in '88, to $2.31 in '98; the cost of treating the ore per ton has varied from $2.25 per ton in '87 to $1.08 per ton in '97. The average yield of the 2,786,421 tons crushed has been $3.07 per ton; the average cost per ton, $1.45; the average profit per ton, $1.62. The figures are official and furnish a good example of scientific mining of low grade gold ore at a profit.

THE larger the diameter of the pulleys and drums used the less detrimental bending stresses exerted upon wire rope, but in all cases they should be mounted to run truly in their bearings, otherwise there may be much injurious side friction and mounting of the rope. According to some practises the diameters of the pulleys and drums are never less than ten times the circumference of the rope to work upon them; in others, one foot in their diameter is allowed for each pound of rope per fathom. Scientifically considered, the gauge of the wires used in any winding rope should seldom exceed $\frac{1}{300}$ parts of the diameter of the smallest pulley over which it has to run. The more acute the angles of working, the more flexible should be the type of rope employed. The following may be the approximate depth of shafts at which the weights of wire ropes composed of different materials may equal their working loads or strength: Patent cast steel ropes, 4200 feet; plow steel, 6000 feet. In the majority of cases conical drums with spiral grooves are the best form for winding purposes, and by which fluctuations, in the engines, their speeds and running strains are fairly counterbalanced or compensated. In the case of ropes of ordinary construction, after their weight has been reduced 25% by attrition or wear, the limit of safety or useful duty has been reached. The application of neutral lubricants and preservative compositions at frequent intervals is of importance. Side friction of ropes caused by their being wound or coiled upon drums should be minimized as far as possible, and kinking carefully avoided. If the rope exhibits a tendency to run on the drum from the right to the left hand, the lay of the rope used should be in the same direction, and conversely an opposite lay should be adopted if the rope coils from left to right. Wire ropes should always be stored in dry places and never placed upon the ground without some intermediate source of protection; their uncoiling should be effected from off rotary reels, so as to avoid the liability of injurious kinking. That winding ropes, fastened at one end to cages running in fixed guides and at the opposite end to the engine drums, rotate at work, seems at first thought an impossibility, but upon careful investigation and reflection, that this action will occur will be allowed; indeed, if this were not the case, the ropes would be found to have worn only on one side or in certain local places, whereas winding ropes will be seen to have become uniformly worn all around their circumferences. These revolutions are due to the strands forming a screw-like spiral structure.

How Horseshoes Are Made.

Probably few of our thousands of readers are aware of the large amount of painstaking labor required to produce a horse or mule shoe that will meet the demands of rough travel in the mining regions of this west half of America. Herewith is presented a brief description of the manner in which the Eagle Horseshoe Co., South Milwaukee, Wis., supply the finished product. Their experience is that the quality of iron most suitable for horseshoes is obtained by combining No. 1 wrought forge and old horseshoes, and these are used exclusively in such manufacture by them. After the material is received in the piling department it is selected, cleaned, prepared and treated. The scrap is first piled on boards of convenient size and taken to the large furnaces, heated to a welding heat, then passed to the billet mill, where it is rolled down into billets from 2 to 3 inches square and from 20 to 30 feet long. These heating furnaces are long firebrick structures bound with iron and provided with doors through which the iron is charged and drawn. Crude petroleum is used for fuel and is sprayed into the furnace by steam, producing a flame which fills the interior and brings the firebrick lining to a white heat.

From each furnace, an overhead track leads to the rolling trains, and a large pair of tongs suspended from a trolley is used to convey the white-hot iron to the rolls. The iron after being rolled into billets is passed to a large pair of shears, where it is cut into pieces of the required length for use in the small rolling train for the production of horseshoe bars. After being cut, the billets are taken to another furnace and again heated to the proper temperature, after which they are passed back and forth through the rolls of the small mill until they are reduced to the desired size for a horseshoe bar. In the last pass the bar is creased, the creases found in a finished horseshoe being impressed in the hot iron while passing through the rolls.

The bar thus produced is sheared into horseshoe billets or straight pieces of iron, creased, and of the proper length to be formed into horseshoes.

The creasing rings are turned, bored, faced and milled by machinery and finished by hand. The work requires care, as the misplacement of a nail point by a sixty-fourth of an inch will cause the ring to be rejected.

After being cut the required length the horseshoe billets are taken to the punching machines, where the nail holes are punched in them. The billets are then passed through a burring machine to remove the burrs made by the punches, and piled near the bending machines, each of which is operated in connection with a reheating furnace in which the horseshoe billets are brought to a working heat. They are then fed continuously to the benders, which automatically convert the straight billets into the desired horseshoe shape and swedge the heels.

The horseshoes thus formed are finally passed through a finishing press, where they are properly concaved and given a polished and cleanly appearance, after which they are conveyed to the hot bed for sorting and inspection.

After inspection the shoes are packed in kegs containing 100 pounds and are placed in the warehouse to await shipment or placed in bins conveniently located to enable the manufacturers to put up the shoes in assorted kegs. The shoes in this way are subject to careful inspection, and it is rare that an imperfect shoe is allowed to leave their factory.



Making Punches.



Piling Department.



One of the Large Furnaces.

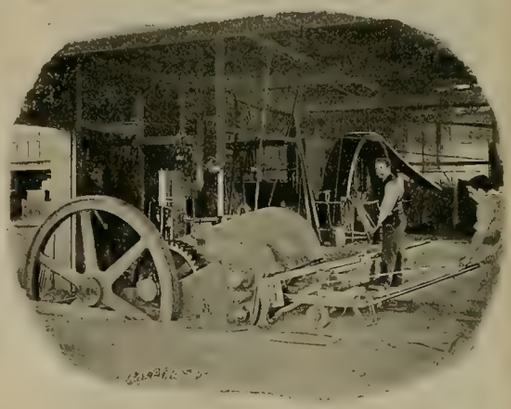


Rolling Billets.

On the Concentration of Ores by the Use of Water.

Written for the MINING AND SCIENTIFIC PRESS by CHAS. TAYLOR.

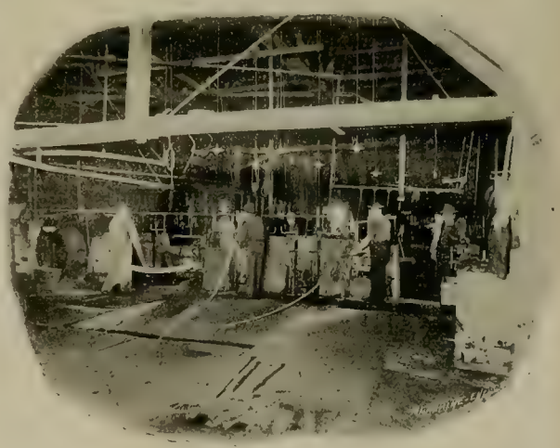
Notwithstanding the improved modern methods for the extraction of the precious metals from their silicious or other matrix, there yet remains, and always will remain, use for the sizer, the pointed box, the jig, the vanner and the various other devices for the con-



Shearing Billets



Another Furnace.



Rolling Horseshoe Bars.



Shearing Horseshoe Billets.

centration of ores by the use of water. Ores suitable for concentration may be divided into two classes. One class requires coarse crushing in the beginning and final crushing towards the end of the operation. The other class may require to be crushed but once. This paper deals only with the first mentioned class.

As all, or nearly all, the losses in the concentration of ores are in the slimes, it is essential to crush finer than is necessary to free the metal from the waste. The making of slimes is begun in the mine itself. The shot that breaks the ore in the stopes makes slimes, and concentration should be begun then and there. In other words, the clean metal should be picked out and sent on top separately. Of course this hand assorting can be carried too far, to a point where the expense will exceed the profit. The superintendent will necessarily be the judge as to how far to carry this sorting or concentration in the mine.

Again, when the ore from the mine is dumped on the grizzly, the clean pieces of metal, if any, should be thrown to one side instead of through the rock breaker, as, after a piece of metal is clear and free from gangue, to break it again makes slimes and the making of slimes entails loss. Too much stress cannot be laid upon this point, namely, that when a piece of metal, no matter what its size may be, is free from gangue, or, in other words, carries as much value as the concentrates you propose to make, that particular piece of mineral has gone far enough; any further progress through finer degrees of crushing makes slimes.

As to the first crushing, we will suppose that, having been sorted in a mill, and again at the foot of the grizzly, crushing to a cubic inch frees enough of the metal to justify concentration at this stage. I know of no jig or mechanical appliance of any kind which will automatically dress ores of this size; therefore the crushed ore should be passed through a revolving screen or trommel of ¾-inch mesh upon which water is sprayed.

The coarser material which does not pass the screen should be discharged upon a moving belt or table of some kind, where, having been washed by the water sprayed upon it while in the screen, it can be easily and quickly assorted; the rejected portion passing over the end of the table should then be recrushed to the same size as that which passed through the screen, and be added to that product, and the whole passed through a series of revolving screens or trommels for jigging in the usual manner.

Now a word about jigs. A jig, to do its best work, should have a quick down stroke of the piston and a slow recovery. The ordinary eccentric does not give this motion. A blacksmith and carpenter can apply the necessary appliances to produce this motion to any jig, and, contrary to the general belief of concentrator men, it improves the work on fine material as much as on coarse. As to the material for the last, or finest jig, in my opinion 16-mesh should be the limit, as a corrugated belt will do as much work as a jig on material of this size, and do it far better, although I have seen a jig working a 30-mesh product and doing fair work.

Another point I will touch upon here. The discharge for the concentrates off the jig screens should be in the center, as, in that case, you can allow the concentrates to fall into the hutch without disturbing the water level in the jig or the flow of tailings to the crusher below; whereas, with a side discharge, whenever the concentrates on screen are drawn water is also drawn off to that level, the flow is interrupted, and that compartment of the jig ceases to work until filled again with water. This stoppage does not matter much in so far as the jig is concerned, but interferes greatly with your finer concentrating machinery below, for the reasons which will appear later on. One man can fit a half-dozen jig compartments with a center discharge in a day at very small cost.

(TO BE CONTINUED.)



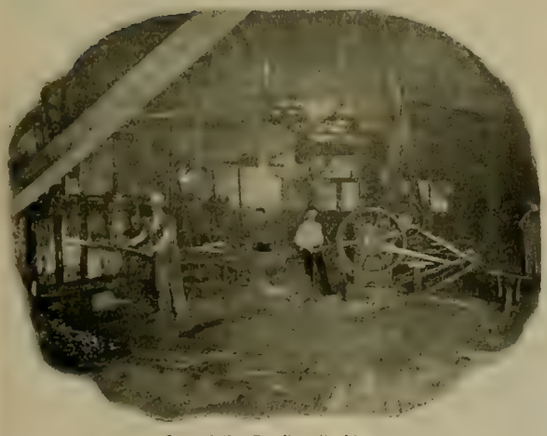
The Machine Shop.



The Punching Machines.



Burring Billets.



One of the Bending Machines.



Sorting Shoes.



In the Shipping Room



Making the Kegs.

(See opposite page.)

A Great Dredger.

A double hull suction type dredger, with an hourly capacity of 7000 cubic yards, has recently been constructed by the Societe Cockerill of Belgium for use on the river Volga by an American engineer. The dredger is in two parts so as to pass through the Marie canal en route from the Baltic to the Volga. The double dredger can be operated as a whole, making a bottom cut 62 feet wide, or each half can be operated separately. Each half measures 216 feet by 32½ feet wide and 9 feet deep. At light draught the hull draws 4 feet of water, the working draught being 8 inches greater. The dredger is electrically self-propelling and controllable, the electric installation of each half being a 600-kilowatt generator directly connected to a fore-and-aft triple-expansion engine. The generator supplies two stern motors and two bow motors, each of 125 H. P., driving 41-foot screw propellers. The generators also supply power to the two 30 H. P. motors mounted in the distributing pontoon and arranged to control the position of the pontoon line as required by operations. Lighting is done from a separate installation. Control of all motors is centralized in the pilot house. Quarters are provided for the crew and government engineers on each hull. The pipe pontoons are elliptical air jackets, reversible, and not easily affected by wind, waves or currents. Metal joints are used, as they do not obstruct the discharge stream so much as rubber connections. Each pair of compound cutter engines works four cutters and each main pump can develop 1500 H. P. The tender for this huge plant is a stern-wheel ten-knot steamer.

Each of the two hulls is built entirely of steel, with a 3-inch pipe deck and a light frame deck-house,

Near the bows are recesses for the succession ladders and their bearings, and further back the hull is cut away on each side to provide space for a screw propeller. There are twin screws and rudders. The interior of the hull is divided by transverse bulkheads into water-tight compartments. Throughout the central part of the boat for three-fourths of its length there is a double bottom, which is in turn divided by longitudinal keelsons and water-tight floors into compartments, each of which is provided with an ejector.

The main centrifugal pump runs at 150 to 180 revolutions, and is driven by a divided vertical triple-expansion engine, two of the cylinders being on one side of the pump and two on the other. The engine weighs complete forty-five tons.

The engine for driving the electrical generator is of the usual vertical marine type, triple expansion, three cylinders working on three cranks. A large governor acts on the valve gear of the high-pressure cylinder, regulating the speed. The cutters are driven by a pair of horizontal tandem compound engines placed side by side, with shafts coupled together to quarter cranks.

Dredging for Gold.

Written for the MINING AND SCIENTIFIC PRESS by THEO. F. VAN WAGENEN, E. M.

While it cannot be claimed that gold dredging in the United States has yet attained an established position as an industry, still substantial progress has been made, and there can be no doubt of the ultimate outcome. Of course, with our characteristic energy a very large number of enterprises have been inaugurated upon ground utterly unsuited to this method of mining; many dredgers have been designed and built by men entirely without mechanical ability or experience, and several have been erected to operate ground carrying so little gold per cubic yard that financial success was hopeless from the start. In fact, there are not lacking instances when expensive machines have been set up to dig ground that was entirely innocent of any value whatever in the precious metal. Out of nearly one hundred efforts I cannot now recall a dozen that have become financial successes. Two or three of these are in Montana, one at Idaho City, Idaho, three are on the Snake river, Idaho, and the balance in California. It may be considered, at the first blush, that 10% represents a very small proportion of success against a very large proportion of failure; yet if we examine into the early history of any mechanical industry now a decided success, it will be found to be strewn with as notable a number of wrecks as the one under consideration. For, aside from the inevitably large number of mechanical problems to be solved in the inception of any business involving the use of machinery, incompetent men, dishonest methods, reckless business management and careless speculative investing always take the lead in such enterprises, and the industry does not get upon its feet till the schemers and the frauds have had their day and are pushed to the rear.

No part of the world affords better or more extensive fields for gold dredging than does the western United States. In Australia, on account of the extreme aridity of the country, even in the recognized gold fields, and the fact that this has been the condition of the island continent for untold ages, there are very limited opportunities. New Zealand is better conditioned, but is itself only a small patch of land as compared with our Pacific States. There are many streams in the Urals and in Siberia that have attractive reaches of dredging territory, but capital will hardly go there until the equally good and more accessible fields elsewhere are occupied. South Africa has practically no dredging territory so far as known, and while the interior of South America possesses many openings of the finest kind in this line, the same conditions rule there as in Russia and northern Asia.

In the western United States we have an extraordinarily large field of gold-bearing alluvium in a climatic zone where precipitation is abundant, and doubtless has been for many milleniums. There has resulted, therefore, great erosion of the original auriferous deposits, followed by the collection of gold in a vast number of modern stream beds of all sizes, from the mountain rill to the mighty Columbia. Many of the smaller of these have already been partially, or even wholly, robbed by the pioneers, but in the vast number of cases the grade has been too light to enable the early day miner to do his work with any degree of thoroughness, or the bottom has been so heavily sown with boulders that he could not handle the ground with the crude appliances of his time, or the volume of water has been too great to be controlled. In all these places thousands of tons of the yellow metal are scattered, which, until the advent of the dredger as a mining machine, have been considered to a great extent beyond the reach of human ingenuity, except at a few places where, by reason of favorable topographical features, streams could be diverted and their channels laid bare.

On the other hand, the advent of the dredger has led many too sanguine souls to assume that another one of nature's doors has been not only unlocked, but thrown wide open. There has been over-confidence in the machine, too much generalizing and too little experimentation as to details; too little preliminary sampling of the ground; too much hasty investment of money under the supervision of men of no mechanical training. In fact, the usual unthinking rush to extract profit from a partially developed, new idea. Presumably, the dredger fever must run its course, during which the usual percentage of fatalities will occur. But perhaps the time has arrived when some valuable conclusions may be drawn even from the bodies of the dead, from the scrap piles that already attract attention in so many quarters, and from the



Prospecting Drill Outfit.

ribs of the hulks that lie stranded among the pines in many an upland valley of the West.

The problem of gold recovery by dredging is wholly a mechanical one, exactly as is the case in hydraulic mining. Stated broadly, it consists of lifting the gravel from its site in the stream channel to a height from which it may be dumped into a sluice box and washed. There must be more or less grade to the sluice (2% to 8%), and it must be long enough



Modern Elevator Gold Dredger

not only to allow the gold a proper chance to settle, but to carry the tailings far enough away, so that they will not flow back under the dredger. Three conditions may exist:

First.—The auriferous gravel may be the material lying at the bottom of a stream of sufficient size to float the dredger at all seasons of the year, as is the case in the Snake, Columbia, Klamath and Rogue rivers and elsewhere; or

Second.—It may be the stuff constituting the beds of mountain streams, covered perhaps with 2 to 20 feet of loam, or even more in places where the waters formerly or at present have expanded into a lake or long reaches of still water favorable to the deposition of silt; or possibly hid 10 to 30 feet deep under tailings that have come down from hydraulic mines on the hills on either side; or

Third.—It may be bars or benches by the side of mountain streams, or even rivers of respectable size, representing what at one time has been parts of their channels.

There are infinite variations of these three conditions. But all of them imply a position for the gravel which does not afford a natural dump, so that it must be lifted from its bed. Occasionally circumstances permit this to be done by the direct action of water, as in the various types of hydraulic elevators, when, of course, the dredger is not needed.

The careful engineer, when called upon to report on the advisability or otherwise of a proposed dredging enterprise, should furnish his clients with definite and thorough information upon the following subjects: Average value of the deposit per cubic yard from top to bottom, as determined by numerous vertical sections from surface to bedrock; and profiles of the bedrock from rim to rim, and of the various strata that rest upon it, with detailed statements as to the comparative value of each strata; the whole supplemented by maps from which may be calculated the cubical contents in payable material of the entire property. In addition to this the examiner should ascertain the material of which the bedrock is composed; the nature of its surface—whether smooth, rugged, soft, hard, even or fractured; the average or maximum size of the boulders, and whether they are rounded or angular; and whether the gravel immediately on the bedrock is cemented or loose. The maximum, minimum and average flow of water in the channel should be carefully observed, the climate of the locality investigated, and a considerable quantity of the the gravel (50 to 100 tons) obtained in small quantities from a large number of places on the ground, from surface to bedrock, and combined, should be first grizzled to separate all boulders over 4 inches in diameter, then carefully sluiced down to black sand. The boulders should be corded up and measured; the black sand also, and the proportion of each to the original mass taken accurately calculated. If there is any notable quantity of loam or clay seams, their probable proportion to the whole mass should be estimated, and if the ground has been worked over in the early days by the miner account should be taken of the old drains, wing dams, levees, shafts, drifts, boulder piles, etc., which he has left behind and which have since been covered by tailings or other workings, for all of these will act as snags in a river bed and, aside frow showing that the ground is more or less robbed, will, when encountered, subject the digging machinery to severe strain. If a piece of ground is well prospected or sampled, all these extraneous features can be so accurately located that a very valuable map of the deposit can be made.

It is a business crime either to buy a piece of dredging ground, or to design a machine to work it, until thorough sampling and prospecting has been done. The question is how to do it effectively and at the least cost. Without it the enterprise is one of extreme hazard. With it the business can be made as certain as farming.

In a very few cases where the deposit is very shallow (5 to 10 feet) and there is little or no underground flow of water, prospecting can be done by shafts, which will cost from $10 to $50 apiece. But in the vast majority of cases these conditions are absent, and pits will cost from $500 to $5000 each, and are often entirely impracticable. The sinking of caissons, either of wood or iron, is an absurdity. Any one of the freezing methods could at times be advantageously employed but for the heavy royalties demanded by the patentees. But the drilling system is, by long odds, the simplest, cheapest and quickest, and it has been proven by experience to yield very accurate results if enough holes are bored and if the machine is carefully worked. Several good machines are on the market, costing from $500 to $3000 each. It should be stated that as yet the manufacturers do not thoroughly understand the work required, and, as a consequence, the standard "outfits" include a great deal of stuff that is wholly unnecessary and lack some appliances that are highly desirable. My preference, after trying several makes, is for an extremely light machine driven by horse power and weighing, all told, less than 1000 pounds. This, when knocked down, with its heaviest part not over 300 pounds, can be transported with ease on skids over snow, sand, water, boulder piles, marsh or roads. The steam power traction drills are entirely too cumbersome for the work. It is true, they can sink a hole quicker when set up, and can move rapidly from point to point on level and solid ground, but, as we all know, dredging propositions are not built that way.

The essentials are: (1) Extra heavy drive pipe, 6 to 10 inches diameter, provided with long, thin couplings, carefully threaded and fitted to the threads on the pipe, so that the ends of the latter abut. These ends should be squared and planed accurately, so that the couplings will have no part in transmitting the force of the blow given by the drive weight. (2) A heavy steel drive head, well shouldered on the pipe. (3) A best quality steel drive shoe. (4) A rig so constructed, with guides for the pipe that it must

go down vertically. (5) A drive weight that cannot fail to strike a fair blow; and (6) a common sense sand pump. These, properly put together and operated by a stout, well-fed horse, with a small boy attachment to keep the horse going, will do wonders.

The pipe should be in 6-foot lengths, and a total of 50 feet will go through a long campaign. There should, of course, be extra shoes and heads, three or four stout chain tongs, a couple of thick, heavy-set jackscrews, and an attachment for operating the sand pump by the power. The drill should be a solid bar, 12 to 15 feet long, 3 to 4 inches diameter, and with detachable bit. A few extra bits should be provided, and they should just fit comfortably inside the pipe with reasonable clearance. The outside diameter of the sand pump should be 1½ inches less than the inside diameter of the pipes, so as to leave ¾-inch clearance all around. The valve should be a couple of inches above the bottom of it. At the top is a rigid bale, to which is attached a link as long as the pump, whose length will be about 3½ feet. It is well to have the pipe couplings rounded on the edges. Every length of pipe, as attached, should be well brushed all around with some thick, semi-fluid grease. Then, if the pipe goes down straight, there will be no trouble in withdrawing.

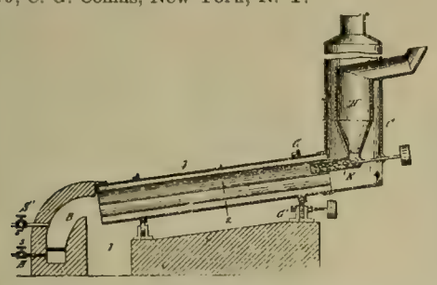
(TO BE CONTINUED.)

Latest Mining and Metallurgical Patents.

Patents Issued Jan. 16, 1899.

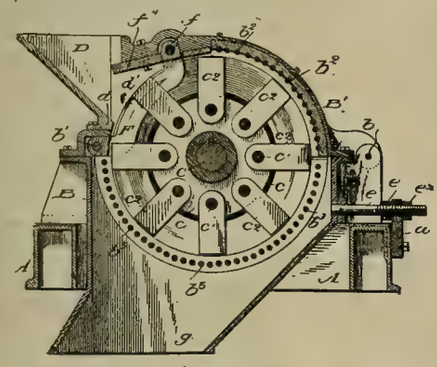
Specially Reported for the MINING AND SCIENTIFIC PRESS.

PROCESS OF REDUCING METALLIC ORES.—No. 641,270; C. G. Collins, New York, N. Y.



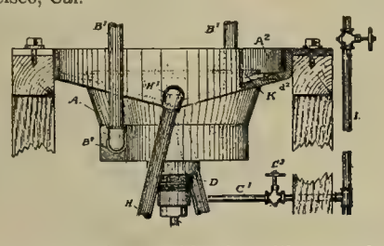
A process of preparing ores for the extraction of metal which consists in mixing the powdered ore with a powdered fluoride and subjecting the mixture to a temperature below the fusion point in the presence of hydrogen gas.

CRUSHING MILL OR DISINTEGRATOR.—No. 641,346; T. L. Sturtevant, Quincy, and T. J. Sturtevant, Newton, Mass.



A crushing mill, combination with pivoted revolving beaters or hammers, of a casing provided with a hopper, grate fixed relative to casing and interposed between chamber of hopper and chamber of casing, the mill having an outwardly flaring and inwardly contracted grate chamber between the hopper chamber and casing chamber, pivoted revolving beaters or hammers within the casing chamber and arranged to extend between and through the bars of the grate, with means for adjusting casing and grate to cause the beaters or hammers to project more or less through the bars of the grate.

ORE SEPARATOR.—No. 641,359; J. Barron, San Francisco, Cal.



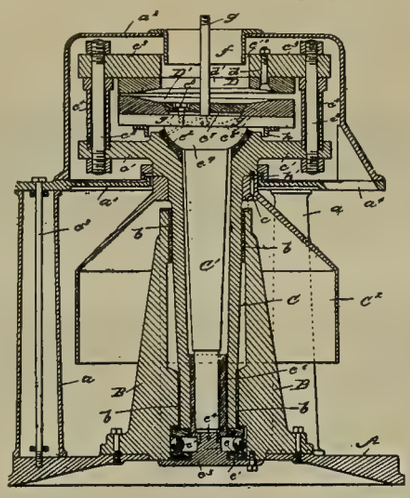
An ore separator, combination with a pan having an outlet over the rim, a tangential inlet at the bottom of pan, a standing hollow cone at center having a series of flat radial abutments with openings beneath level of bottom of pan; a channel surrounding base of cone opposite its openings and having apertured top and bottom walls, a collecting channel below lower apertures communicating with discharge passage, and a source of supply of clear water under pressure to interior of cone and out its openings into the channel.

ELECTRIC AMALGAMATOR.—No. 641,360; L. H. Barricks, San Francisco, Cal.



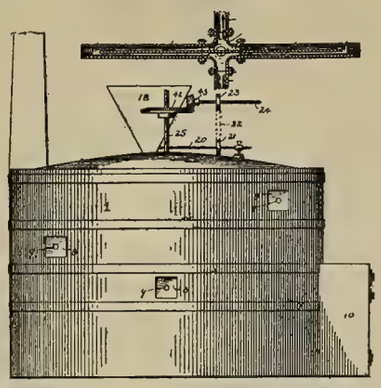
An electric amalgamator including a metallic frame or body having perforated plate secured to its bottom, porous plate resting upon metal plate and forming bottom upon which mercury is placed, pan or box upon which frame or body is supported, adapted to contain saline solution, sluice connecting with frame above porous plate, and having copper plate in its bottom dipping into mercury and serving as negative pole of electric circuit, and plate in pan or box serving as positive pole of said circuit.

CRUSHING MILL.—No. 641,654; T. L. Sturtevant, Quincy, and T. J. Sturtevant, Framingham, Mass., assignors to the Sturtevant Mill Company, of Maine.



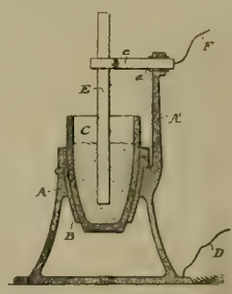
A crushing machine, combination with two rotating crushing disks tilted or inclined relative to each other, two rotating shafts with which disks are rigidly connected and which shafts extend in the same direction from disks, shafts rotating on different axes, one disk being provided with an eye or opening for the passage of the material to be crushed, and both disks having their adjacent faces recessed or cut away for the reception of material between them, combined with means for rotating them so that portions of their proximate faces are continuously approaching while other portions are constantly receding from each other; thereby crushing the material and then discharging the crushed material by centrifugal action.

FURNACE FOR ROASTING AND REDUCING ORES.—No. 641,460; H. B. Meech, Denver, Colo.



A cylindrical roasting furnace with two or more ovens one above the other, each having an opening in the bottom or bed thereof, a flanged discharge wheel located in each opening mechanism for rotating discharge wheel, in combination with hollow vertical shaft in sections, jointed together by center pieces, having horizontal arms fast thereto, center pieces and arms each interiorly divided into two chambers by a horizontal partition therein, and mechanism for rotating shaft.

PROCESS OF AGGLOMERATING COMMINUTED ORES OR CONCENTRATES.—No. 641,552; M. Ruthenburg, Philadelphia, Pa.



In assembling a mass of independent particles of ore or concentrate, in the path of an electrical current, subjecting it to the action of an electrical current, until the contiguous corners of its component particles cohere, and terminating the action of electric current, while the coherent body, thus produced, is of open, porous structure.

PROCESS OF EXTRACTING GOLD OR OTHER METALS FROM REFRACTORY ORES.—No. 641,652; A. G. Stephens, Los Angeles, Cal.

A composition for the extraction of gold and other metals, composed of water, chloride of lime, muriatic acid, nitric acid, bromide of potassium, and chloride of sodium, to be varied according to the refractory conditions of the ores treated.

Mining and Metallurgical Section of the Franklin Institute.

TO THE EDITOR:—The Mining and Metallurgical Section held its stated monthly meeting on Wednesday evening, Jan. 10th. The following officers were elected to serve during the year 1900: Joseph Richards, President; A. E. Outerbridge, Jr., Vice-President; Dr. David K. Tuttle, Vice-President; G. H. Clamer, Secretary; Dr. Wm. H. Wahl, Conservator.

Prof. F. Lynwood Garrison read a paper on "The Lead and Zinc Mines of Southwestern Missouri." These mines are in the locality known as the Joplin district, and it is the belief of Prof. Garrison that this region is destined to become the greatest zinc producing district in the world. Speculators are spending vast sums of money there at the present time—during 1899 it being estimated that $40,000,000 were expended in the development of the mines. We are, however, much surprised to learn that the increased output has only been 9% for 1899 over 1898, while 1898 showed 29% increase over 1897, and 1897 showed 23% increase over 1896.

It is quite unaccountable why last year should show such a relatively small increase and the two previous years so marked an increase, when we consider the vast sums expended in 1899 and the high price of ore.

The value of the district's production amounted to nearly $11,000,000, and the cost of production about $8,000,000, leaving a small amount out of which to pay dividends on such large capitalizations.

Prof. Garrison's paper was well illustrated by slides and specimens. G. H. CLAMER, Sec'y.

Melting Points of Various Alloys.

	Melting Point. Celsius.
Cadmium	315°
Zinc	412°
Aluminum	620°
Silver 800 parts, copper 200 parts	850°
" 950 parts " 50 "	900°
" fine	954°
Gold 600 parts, silver 400 parts	1020°
" fine	1075°
" 950 parts, platinum 50 parts	1100°
" 900 " " 100 "	1130°
" 850 " " 150 "	1160°
" 800 " " 200 "	1190°
" 750 " " 250 "	1220°
" 700 " " 300 "	1255°
" 600 " " 400 "	1320°
" 550 " " 450 "	1350°
" 500 " " 500 "	1385°
" 450 " " 550 "	1420°
" 400 " " 600 "	1460°
" 350 " " 650 "	1495°
" 300 " " 700 "	1535°
" 250 " " 750 "	1570°
" 200 " " 800 "	1610°
" 150 " " 850 "	1650°
" 100 " " 900 "	1690°
" 50 " " 950 "	1730°
Pure platinum	1775°

ONE of the latest triumphs in the engineering world consists in the construction, shipment by steamer and subsequent transfer to railway transportation of a steamer of 4200 tons displacement, which was finally put afloat in Lake Baikal, Siberia, not less than 5000 miles from St. Petersburg.

The Formation of Coal.

Carbon is the principal element in the composition of coal. A good specimen of hard, dry anthracite has 95% carbon. Average anthracite would show from 85% to 90%; bituminous and semi-bituminous varieties would range all the way from 50% to 85%. The amount of volatile matter contained increases from 3% in the anthracites to 38% in the bituminous species. The conduct of these different kinds of coal in combustion gives practical emphasis to the difference in composition. The anthracites burn with a small blue flame of carbonic oxide until thoroughly ignited, give off no smoke, and leave a comparatively small percentage of ashes. The bituminous class, on the other hand, burn with a continuous yellowish flame, give off considerable smoke and leave a large percentage of ashes.

That coal is a vegetable product may be specifically proved. While to the naked eye the structure of a fragment of mineral coal is purely amorphous, yet if that fragment be made so thin that it will transmit light, and if it be then examined through a powerful microscope, its vegetable structure will be readily distinguished. Heat, pressure and confinement have produced the transformation. It is simply a process of smothered combustion. The operation may be watched in any peat bog. A peat bed is an accumulation of the remains of plants which have grown and decayed, and have been, year by year, buried more deeply under succeeding growths. Remove the upper layer, and one finds peat, with its 52% to 66% of carbon. The deeper, that is, the older and longer buried the product, the better its quality for fuel. If this process of deposition should continue through many geologic ages, the result would be true coal.

During the Carboniferous age the area now covered by the Mississippi valley was little more than a vast marsh burdened with the most luxuriant vegetation. The conditions were all favorable for the rapid and enormous growth of plants. The soil was rich and moist. The heat was greater than exists to-day at the torrid zone. The humidity of the atmosphere was great and constant. The air was laden with carbon. Plants luxuriated in it. They grew to enormous sizes. Plants which in our day are mere stems, a fraction of an inch in diameter, were in that time represented by trees from 1 to 3 feet in diameter and from 40 to 100 feet in height. This mass of vegetation, including more than 500 different species, was constantly growing, falling and decaying, each succeeding growth forming a still richer bed for the vegetation to follow.

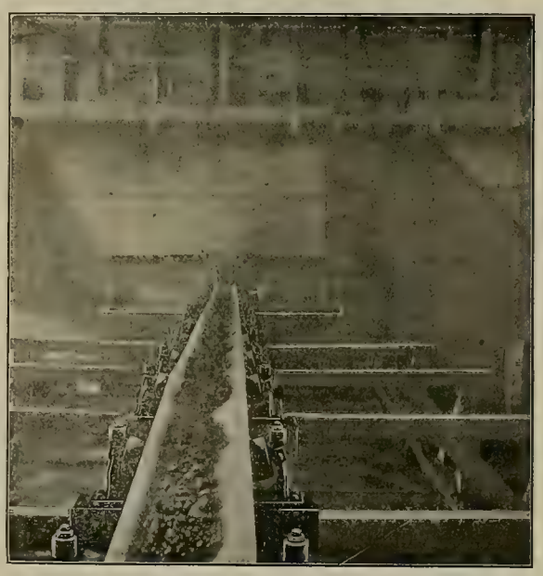
If the theory propounded by Laplace be correct, our earth was at one time a ball of liquid fire. Cooling and condensation progressed from the surface toward the center. Contraction of the earth's crust necessarily followed, and vast areas of land sank and were covered by the waters. This process was still going on during the Carboniferous age. The submergence of a bed of this incipient coal meant the cessation, for a time, of vegetable growth from its surface. That surface was covered instead by the sand, mud and gravel washed over it by the waves, by the drift from higher levels and by the limestone deposits swept up to it from the sea. When contraction ceased for a time and the earth's crust again became stable, the waters began to recede, leaving behind them great wastes of mud and sand. And, following this slow recession to the sea, vegetation crept once more over the surface of the land, the soil grew rich with the products of decay, and plant life reigned and rioted anew. But cooling and contraction of the earth's body were going continuously on, and submergence followed again and again, each bed of vegetable matter, thick or shallow, being covered in turn by its layers of sand and silt.

In this submergence and burial of the deposits of the coal era is found all the conditions necessary for the transformation of vegetable matter into coal. Only from one-ninth to one-sixteenth of the mass of vegetable matter subjected to this heat and pressure was retained in the form of coal. This was largely carbon, the hydrogen and oxygen having been expelled. The anthracite coal contains a much larger percentage of carbon than the bituminous, and a much less quantity of volatile matter. Of the immense coal areas in the United States only an extremely small percentage are of the anthracite variety, and these all lie in the State of Pennsylvania, east of the Allegheny mountains, with the exception of a small field in Rhode Island. It is not thought that the vegetable life which entered into one class differed in any material respect from that which entered into the other.

The presumption is natural, if not conclusive, that prior to the close of the Carboniferous age all the coal deposits had been bituminous in character, but that the violent movement of the earth's crust at the time of the Appalachian revolution, the enormous pressure and intense heat, were sufficient to expel a large portion of the volatile matter from the bituminous coal beds, and otherwise change thein character into what we now class as anthracite. In the slate strata immediately overlying each coal seam, it is common to find the impressions of twigs, nuts, seeds, leaves, delicate fern tracery, and the trunks of great trees smashed flat between the layers; while in the softer beds of cannel coal whole trees have been found, roots, trunks, branches, leaves, seeds, and all transformed into like material with that by which they were surrounded. One of the results of the violent disturbances of the earth's crust already noted was to leave great rents in it across the lines of strata. These rents are known geologically as fissures. They have faces which are either parallel or inclose a wedge-shaped cavity. Sometimes igneous rock from the molten mass below was forced up into these openings; sometimes the cavities were filled with drift and rock fragments from the surface. In either case the mass became hard and compact, but with a character materially different from the rock on either side, the formation of which was contemporaneous with that of the coal. The mind must exert itself to the utmost in order to fully realize through what vast periods of time the processes were continued by which the coal of to-day was formed.

Jeffrey Century Belt Conveyer.

The accompanying illustration shows the Jeffrey Century belt conveyer as used in the plant of the De Lamar mines of Mercur, Utah. This is one of several conveyers of various dimensions used by this company for handling ore. The Jeffrey Century belt conveyer is especially designed for the handling of all abrasive material, which should be carried rather than scraped, to avoid excessive wear. The principal features of the Century belt conveyer are: First, the belting: a special grade having its carrying side re-enforced with an entra thickness of rubber of a special composition, which effectually resists the cutting tendency of the material and greatly prolongs the life of the belt; an ordinary rubber belt would not be satisfactory for this class of work. Second, the carrying idlers, which consist of special stands and pulleys; the latter, running on self-lubricating pulleys, require oiling only at long intervals. The pulleys are set so as to give the belt the shape of a trough, thus concentrating the material in the center of the belt and keeping it from spilling over the sides.



Jeffrey Century Belt Conveyer.

These conveyers are manufactured by the Jeffrey Manufacturing Company, Columbus, Ohio, in all lengths and sizes for various duties, and any one desiring special information and prices should write for catalogue and full particulars.

Properties and Characteristics of Clay.

The properties and characteristics of clay depend upon, first, the kaolin minerals, and second, the impurities. In the case of the former, the conditions in which their fragments are found is important; that is, whether their individual particles consist of prismatic crystals, minute plates or thin cleavage scales, resulting from either the simplest form of disintegration of the original crystal, such as is brought about by the action of the frost, or from abrasion, suffered during transportation from its place of origin to its home, as a sedimentary deposit. In the case of the impurities, much depends upon both the absolute and the relative quantities of each present, and its state of fineness or subdivision.

Clays are characterized by no special color. The pure variety is white; but they commonly occur gray, drab and bluish, often mottled and variegated. They are also found of almost all colors, frequently being brilliantly tinted with reds, yellows and purples. Organic stains give a variety of colors, often brilliant in hue, purple and red being the most striking. Different compounds of iron, the most common coloring causes, give greenish, gray, yellow, brown and red tints. The colors are deepest when the clay is moist, and they grow lighter as the clay is dried.

The colors effect the use of the clay in its raw state; as, for example, its use in the manufacture of wall papers, the adulteration of foods, etc.

In most cases its color, in the natural state, enables one to confer the color of the burned product. Organic stains, however, disappear on burning, while the iron stains are modified or developed by both the intensity of the heat employed, and the degree of oxidation effected in the process of burning.

Clays are usually characterized by a peculiar odor or argillaceous smell, which is not invariable, and by a smooth, unctuous feel, which is also frequently absent, being dependent upon the fineness of grain and the absence of coarse impurities or grit.

In density, hardness, tenacity, etc., clays differ widely, being modified in these particulars by their geological history. Among the crystalline rocks, where they originate, they are apt to be coarse and loosely adherent, but often transportation and secondary changes which they may have undergone, following their accumulation as sediment, such as compression, the loss of water, infiltration of mineral matter, etc., etc., changes their general structure widely. They vary from soft, porous, incoherent masses, through tough, compact varieties, which are often laminated or have a fissile structure, on to exceedingly tough, and even to varieties which are so hard that splinters flying from beneath the blow of a heavy hammer will cut the flesh of a workman. Such clays belong to the class known as flint clays, and are mined only by drilling or blasting. The degree of hardness varies, in the scale of 10 used by mineralogists, from 1 to 3.5; but this is hardness of the clay mass technically a rock, and not that of the individual clay or kaolinite particles, the hardness of which has not been accurately determined, owing to their extreme smallness.

The specific gravities range from less than 1 to about 2.5, pure kaolinite having a specific gravity of 2.60. The specific gravity varies with the state of compactness of the mass. A clay found in Georgia will float for a time in water, and when coated with a thin film of paraffine it floats like a cork.

The Properties of Some New Alloys.

This was the caption of an address recently delivered by A. E. Tucker, in which he pointed out instances of change in alloys due to external action and internal causes, and described a nickel aluminum alloy containing 4% of nickel, which, in a few hours after being cast, fell to powder at ordinary temperatures, an extraordinary result when the toughness and malleability of the separate metals was regarded. The effect of bismuth on copper and brass was also referred to, and he said that the matte might be summed up in a general statement that, given the properties of a definite alloy, the effects of introducing even a trace of a foreign substance into it could not be foretold by any reasoning from analogy. The past masters of metallurgical art, the Japanese, had only reached their skill by generations of intelligent plodding, and often baffled us, with all our science, in the discovery of their methods. He alluded to the application of metallic aluminum as a means of producing the rarer metals in a pure form, which process seemed likely to replace the more complex apparatus of the electric furnace. Steel has recently been produced by melting hematite pig with steel scrap, and adding to the natural hardness of the mixture so obtained by a judicious addition of manganese-tungsten alloy, the solidity of the ingots being insured by adding aluminum nickel. He said that it would be apparent, bearing in mind the number of metals at present at practical disposal, that an infinite field of research is open, and one in which the reward to the worker is great. The amazing variation of properties caused by a slight change in alloy composition has long been known, and as the number of metals available for alloying steel are large the possible combinations are practically infinite.

Popular and Trustworthy.

The MINING AND SCIENTIFIC PRESS of San Francisco has begun its 80th half-yearly volume, and is greatly improved in appearance by the addition of clear new type. The MINING AND SCIENTIFIC PRESS is standard authority for correct mining news, and has no superior anywhere as a popular and trustworthy journal in the line of mining information. We extend good wishes for its continued prosperity.—Yreka, Cal., Journal, Jan 19.

MINING SUMMARY.

ARIZONA.

MARICOPA COUNTY.

(Special Correspondence).—Phœnix was founded in '70, and in '71 had an American population of seventy-five men and one woman. Its present population is 12,000 or 15,000. It is centered in a valley of 300,000 acres of fruitful land, and needs a storage reservoir system and internal railway intercommunication, both of which are under way.

In the Salt River valley the Hudson Reservoir Co. (a private corporation consisting of New York men) has begun operations sixty-five miles above Phœnix, below where Tonto creek and Salt river meet, to construct a dam, arrow-shaped, dam site 201 feet wide at water level in hard rock, with bedrock 25 feet deep, to impound water one and one-half miles wide, twenty-four miles long, average depth 80 feet. This, it is expected, will furnish all the water necessary for the 300,000 acres of land in the Salt River valley. An expenditure of $2,000,000 on this problem is anticipated, without government aid. Gov. Murphy says he favors government aid in the construction of reservoirs and in the cession of government lands absolutely and without restriction.

Equally important with the question of water storage is railway transportation. Arizona needs more railroads and an independent outlet. This can be obtained at the headwaters of the Gulf of California. The material prosperity of Colorado began with the introduction of narrow-gauge railways, which penetrated into every mining camp. The same thing will occur in Arizona. A company has been organized embracing a narrow-gauge railway system, having its center in Phœnix, and branching out as far east as Ray, Riverside, Globe, the timber region of the Tonto basin, Clifton, Morenci and reaching Flagstaff on the Santa Fe system. North of here it goes to Castle Creek, Big Bug, Prescott, Jerome and other points throughout the mountain region. Southwest it will touch a point at the head of the Gulf of California, only 183 miles distant from here. This narrow-gauge system can be built at a minimum of expense; and, if connected with the Denver, Rio Grande & Western, would make a new route from Denver.

Phœnix, Jan. 22.

PIMA COUNTY.

(Special Correspondence).—J. P. Camou, Guaymas, and his son-in-law, A. Morales, are in Phœnix closing a deal for the San Rafael del Valle grant, 75,000 acres. The San Rafael grant lies along the San Pedro river north of Nogales, and has for some years been occupied by the Packard Cattle Co.

Guaymas, Jan. 9.

YAVAPAI COUNTY.

(Special Correspondence).—T. E. Farish, Mgr. Whipsaw Copper Mines Co., in Castle Creek district, sixty miles from Phœnix, has fifty men employed in development work. The shaft is 165 feet deep. A 400-foot tunnel is in ore 3 feet wide, carrying 10% copper and $10 in gold. Drifts are being run both ways from the tunnel. The veins are iron-capped in a schist formation. A sixty-ton water-jacket furnace is being built to treat the carbonates and oxides. It is a close corporation, the capital being furnished by Col. Christy of Phœnix and New York parties.

Castle Creek, Jan. 20.

Jerome hears that another large copper smelter is to be built there by the United Verde Ex. M. Co. The company has begun the construction of a pipe line to the proposed smelter site.

CALIFORNIA.

Gov. Gage has called an extra session of the Legislature, to convene at Sacramento on the 29th inst. Among other business, he wants the Legislature to "consider and pass and re-enact the law repealing the Act of the Legislature, which was approved March 27, 1897, concerning the manner of locating mining claims upon the public domains of the United States."

AMADOR COUNTY.

The Valparaiso Mining Co. has incorporated at Jackson. Directors—D. Boro, W. F. Detert, A. Ginocchio, E. Ginocchio and G. Poggi; capital stock, $25,000, subscribed.

CALAVERAS COUNTY.

The Gold Hill Mining Co. will forfeit its incorporation charter in the State of Illinois and incorporate under the California laws that the stock company can be assessed to further the development of the mine at Smith's Flat. The company had intended to put up steam machinery on the Osborne-Truax mine at Smith's Flat, but have concluded to sink a two-compartment shaft 100 feet deep.

FRESNO COUNTY.

Work has been begun on the reservoir of the San Joaquin Electric Co. in Crane valley. There will be an artificial lake two miles long with enough water to supply power during dry seasons.

Following is a letter from Congressman Needham to the Petroleum Miners' Co-operative Association: "I beg leave to acknowledge receipt of a petition of the Petroleum Miners' Association, with affidavits, circulars, etc. I have presented the petition and papers to the Interior Department for its consideration and the same have been filed. I suggest, however, that whenever a location by script or otherwise is placed upon an oil claim that the oil claimant immediately file with the department affidavits showing that the claim is more valuable for mineral than for agricultural purposes, and also evidence going to show fraudulent filing upon the claim by those other than the mineral claimant, and giving description of the claim by township, range and division of the section. The department here claims that while there is a blanket affidavit tending to show that this whole region is oil-bearing, still it would not be legal to hold that it is all oil-bearing and none of it agricultural in character. The blanket affidavit and petition, circulars, etc., are valuable to inform the department of the situation, still they are not sufficient legally to protect the rights of oil claimants in the oil region. I feel warranted in saying that if every oil claimant will inform the department as soon as an agricultural filing is made covering the same piece of land and proof by affidavits is filed, showing that the land is more valuable for mineral than agricultural purposes, that the rights of all parties will be thoroughly investigated and protected.

KERN COUNTY.

At McKittrick oil fields in the big well the 9⅝-inch casing is securely capped, the two escape pipes being supplied with stopcocks, one of which is opened ½ of an inch to relieve the pressure. Through this opening 100 barrels of oil pours daily into tanks. The pipe line to McKittrick is to be completed.

MADERA COUNTY.

The California Copper Co. reports a vein of copper. The company's smelter will be started up soon. The smelter is located at Madera. Assays show an average grade of 17% for 26 feet width. The Southern Pacific is laying 6000 feet of track, connecting the mine with the railway, and the work is expected to be completed next week.

MARIPOSA COUNTY.

J. H. Galey has the Murphy mine bonded and is doing development work. The Gazette hears that Supt. Gilbert of the Virginia mine will soon be on the ground to commence operations. Drawn & Co., managers of the Longfellow mine near Big Oak Flat, are inspecting the old Red Cloud mine.

The Quail mine on Indian Gulch has changed hands and names. The company to whom it was bonded made a sale and changed its name to Hartford.

T. P. Bisland is the Supt. of the Nameless mine, once called the Bonanza.

The Columbia Mining Co. has finished the dam on Maxwell's creek, near the Tyro mine, and began work on their property. A ditch a mile and three-quarters in length will convey the water to the mill, where it will have over 600 feet pressure.

MERCED COUNTY.

The Merced Oil & Mining Co. has incorporated at Merced; capital stock, $100,000, subscribed $3500; C. H. Castle, M. D. Wood, A. Harris, E. C. Mason, S. C. Cornell.

NEVADA COUNTY.

The Comet mine, on Osborn hill, near Grass Valley, has been bonded by Broughton & Shovell, from Butte City, Mont.

Construction of the dam across the Truckee river, near Floriston, for account of the Truckee River General Electric Co., progresses. The officers say that the plant will be in operation next July.

The Mountaineer mine is reported in good ore. Ten of the mill stamps are dropping.

ORANGE COUNTY.

The Santa Ana Bulletin says that a rich copper field is discovered at the junction of San Diego, Orange and Riverside counties, a part of the field being in each county; prospect work has been done on 150 claims. Assays show an average of 17%. The larger part of the claims are in Orange county. There is one Mexican claim in the 150, which belongs to M. Lopez, of Capistrano, who has refused to sell.

PLACER COUNTY.

At Forest Hill the Mayflower hydraulic mine, which was shut down for a week, has resumed:

The Bath mine is now paying and additional men have been put to work.

PLUMAS COUNTY.

Near Spanish Ranch the Quincy Mining & Water Co. is actively operating the Bean Hill mine.

SAN BERNARDINO COUNTY.

The boracic acid factory of the Columbia M. & C. Co., at Daggett, approaches completion. There will be fifty-two tanks, each of 5000 gallons capacity.

SAN DIEGO COUNTY.

At Julian the Owens mine has twenty-five men at work. All the ore is being taken out that the mill can handle. Development work is being pushed on the Kentuck S mine at Banner. A shaft is being sunk in the Ready Relief mine by Bailey Bros.

J. Moore of Arizona has bought a prospect adjoining the Shenandoah mine, at Mesa Grande. He has been hauling the ore to Banner, a distance of twenty miles, but will use the Shenandoah mill.

SHASTA COUNTY.

(Special Correspondence).—The Black Spider mine near Keswick, upon which a San Francisco Co. recently placed machinery, has been successfully unwatered and sinking is in progress. An ore shipment has already been made to the Keswick smelter since the work began. Last week J. E. Isaacs secured an option on the Stowell group of copper claims, which he assigned to the Iron Mt. Investment Co., which is affiliated with the Mt. Copper Co. Work under the stipulation of the option is already in contemplation for immediate action. The group comprises 128 acres of patented land and seven locations. The price is $125,000. The property lies between the Iron Mt. and Balakalala mines.

Work continues under the new bond made to W. A. Temple on the Mammoth group of copper claims near Kennett. A representative of the Halifax, N. S., Co., for whom this property and the Balakalala were secured, is in Redding securing options on contagious copper claims.

On the Own group of copper claims, secured by F. G. King, work was begun last week. The property is near Copley.

Your correspondent is reliably informed that preliminary work will begin within two months on a smelter for the Bully Hill copper mines, owned by J. R. De Lamar.

The Pacific M. & D. Co., of Redding, has secured an option on a section of undeveloped copper lands near Copper City, and also on eight partially developed claims near Stillwater.

Redding, Jan. 22.

W. S. Beale of Bakersfield and D. F. Barber of the General Electric Co. of San Francisco are investigating a plan of C. W. Waller for a power plant to supply the mining districts of the county. The location favored by Mr. Waller is on the Pit river, near Bass' ferry, fifteen miles from Redding, close to the Black Diamond copper mine. An 8000 H. P. plant, a concrete dam across the Pit, etc., cost nearly $350,000, is contemplated.

The Iron Mountain Investment Co. has bonded the Stowel and the Lew Waters groups of copper and gold mines. The purchase price named in the bond is $125,000, payable $12,500 at the Bank of California in Redding, and $112,500 at the Commercial Bank of Chicago, Ill., at the expiration of the bond, Nov. 16, 1900. It obligates the Iron Mountain Investment Co. to put twenty men at work within thirty days from Jan. 16th and to keep at least that number employed during the life of the bond.

SIERRA COUNTY.

James Ross goes to the Magnolia gravel mine near Forest City, which will be worked all winter.

SISKIYOU COUNTY.

Journal: The Dwinnell group of mines recently purchased by C. H. Souther, Boston, Mass., is situated about eight miles from Gazelle, at an elevation of 5000 feet. The vein is tapped endwise for a distance of 250 feet, by a tunnel on the mountain side about 170 feet below the croppings. A lower tunnel has been driven since December 1st to a distance of 140 feet, tapping the vein 105 feet below the first tunnel. It is intended to build a road to Gazelle and prepare for ore shipments the coming season.

The miners of Little Humbug have a good supply of water this winter and are doing well.

TRINITY COUNTY.

(Special Correspondence). — There is present activity in quartz mining here. Some of our placer miners are turning their attention to quartz. Several new discoveries and locations have been made since Jan. 1st. The greatest drawback to quartz mining here has been that few prospectors stopped to look at our hills and gulches as most of them were Coffee creek bound. Three years ago Coffee creek was as little talked of as is our locality here, and while it is a demonstrated fact now that Coffee creek regions have opened up many good veins and lodes, we are demonstrating the fact that we have some good ledges and pockets here. The Keno and Five Pines quartz mines, owned by H. J. Van Ness, are developing into good properties. The Catherine quartz mine, owned by Thrasher & Co., is also turning out well.

Almost all the prospectors here are ordinary miners, working on their own capital—chiefly muscle. Could capitalists be induced to grubstake a few some paying ledges would be opened up. This is principally a pocket country. Several nice pockets have been taken out already, and there are thousands of acres here that have hardly been looked over; much of the land is railroad property.

Bragdon, Jan. 22.

The Bullychoop and Occidental mines will have new machinery.

TUOLUMNE COUNTY.

(Special Correspondence).—Your correspondent began his inspection of mines on the Mother Lode at the Rawhide, two miles from Jamestown. The 40-stamp mill is run by electric power, supplied by the Tuolumne Water & Power Co. It has been in operation fourteen months and succeeds a private electric plant operated by the Rawhide Co. It is considered better to have the electric transmission attended to by men trained to that work than to entrust it to even the best workmen around a mine. The mill reduces from 125 to 130 tons of ore per day; it all goes through the mill. The ledge is 20 feet wide. There are large ore reserves yet untouched. The sulphurets are sent to Selby's. Steam power is used for the hoist and pumps. Of the latter, there are three at different levels, each having a lift of about 400 feet, throwing about two-thirds of its capacity, or 200 gallons per minute, each twenty-four hours. A depth of 1700 feet has been reached in the Rawhide. Seventy men are employed. Chas. Jacobs is foreman of the mine; F. R. Cullers has general charge of the mill, both here and at the App mine, which is under the same management, Nevills & Martin being the owners of both properties.

At the App mine, at Quartz, there is a 20-stamp mill, run by electric power. Here the hoist is run by water. The App has a substantial equipment and is characterized by the same features of solidity and excellence which mark the Rawhide; 40 H. P. is required for the batteries, 40 H. P. for the air compressors and 30 H. P. for the rock crushers and blowers. Both water and electric power are supplied by the Tuolumne Water & Power Co. The App is a comparatively dry mine, what water accumulates being hoisted in skips. A depth of 1000 feet has been attained and large ore bodies have been opened, there being three shoots, each from 40 to 60 feet wide. Thirty men are employed. W. H. Schmall is foreman.

The Dutch mine is located on the edge of the town of Quartz and hardly a stone's throw from the App. The stamps and air compressors are run by steam, but it is in contemplation to substitute electric power for the entire works. There is a neat appearance about the Dutch mine, showing efficient superintendency. The mill contains twenty stamps, and below is stationed a Gates plant for saving sulphurets. The latter are shipped to the Selby Co. From a prospect the Dutch gives promise of developing into a good mine. A barren zone has been passed through and good ore is being taken out of the 1100-foot level. Fifty-five men are employed, with A. Trittenbach as Supt.

The Santa Ysabel, a short distance south of the App, and near Stent, is completing a modern and effective equipment. In the main it will be an electric plant, but will be able, in a contingency, to resort to water. It has a private electric plant, which supplements the power obtained from the Tuolumne Water and Power Co. Twenty stamps are being added to the present equipment, making forty. A gallows-frame or headgear 80 feet high is ready for the new hoist. A 200 H. P. double-drum electric hoist, duplicate of that supplied by the Union Iron Works for the Empire mine, Grass Valley, is in position. A fine air compressor, set in cement extending to bedrock, is run by a 100 H. P. alternating motor. The entire new plant will be in operation next month. The shaft at the Santa Ysabel is 800 feet deep; ore is being extracted from the 600 level. There is hardly any water in the mine below the 200 level, from whence it is pumped. The mine and buildings are lighted throughout by electricity. Sixty men are employed; E. A. Hardy is Supt., T. W. Hickey is foreman.

I went through the 400 and 500-foot levels of the Jumper mine, one of the famous properties on the Mother Lode, near Stent. Although sixty stamps are incessantly pounding on ore from the Jumper (this being the largest mill in the county), it would seem as if there were

ore enough in sight to keep them going for a generation without uncovering reserves in deeper levels. Sinking is constantly going on. They are now down to the 1150 level, and ore is being taken from the 850 and 1000-foot levels. The Jumper supplies free-milling ore, the values being saved in the batteries and the plates. There are no sulphurets worth saving. The mill is run by power from the company's own electric plant, on Sullivan creek, for six months each year, after which it falls back on the Tuolumne Power Co., which also supplies power for the large air compressor, which in turn runs the hoisting engine. By reheating for the engine, the efficiency of the compressed air is increased 25%. The air is not reheated for the drills in the mine, but is taken direct from the receiver. The Jumper Co. has purchased the Golden Rule mine, adjoining it on the north, and the two mines are run in conjunction. It it probable that in the future a new shaft, at a central point, may be sunk for the two mines. At present the Golden Rule has its own hoist, and mills its rock at the Jumper. About 120 men are employed at the Jumper; 40 at the Golden Rule. The owners are business men of Glasgow, Scotland. P. Geo. Gow is general manager; M. D. Kelley, superintendent; O. A. Cecil, metallurgist and accountant; J. T. O'Brien, foreman.

The Mazeppa mine joins the Jumper on the south. This company has no mill as yet, and is developing its property. It contemplates the erection of a 20-stamp mill. The shaft is 450 feet deep, and there are about 800 feet in drifts. As greater depth is reached, the present steam hoist and compressor machinery will be replaced by something heavier, to be run by electric power. San Francisco business men own this property. The Supt. is H. M. Pease, one of the supervisors of Tuolumne county. Fifteen men are employed at present.

The High Point Mining Co. (Ltd.) of Des Moines, Iowa, is doing development work at Stent. At the Manhattan mine a shaft is being sunk by the aid of a horse whim, but machinery is on the ground for a steam hoist. A depth of 80 feet has been reached, but 200 feet will be sunk before crosscuts are run, at which point it is expected the ledge can be tapped within 500 feet. The Alder Creek Co., also composed of Iowa people, under the same management, is developing the Imogene mine, joining the Manhattan on the north. At the latter shaft there is a small steam hoist, and 200 feet in depth has been attained. They are now crosscutting to strike the ledge. The prospects are considered good at both of these mines. O. O. De Pew is Supt. About twenty men are employed at the two properties.

The Eagle Shawmut mine, on Wood creek, three miles southwest of Stent and about the same distance east of Chinese Camp, is a great property about which little has been written; it is owned by Rosenfeld & Sons of San Francisco. The plant is extensive and excellent, and is housed in ample buildings. The power employed is water under a 480-foot fall, transmitted by wire from a 7-foot Pelton wheel; but there is a large steam plant in reserve. The mill contains forty stamps and sixteen 6-foot Frue concentrators. Below this is a Gates sulphuret saver with forty tables. The slimes from the saver are treated in an agitating cyanide plant. The ore is drawn by mules through a 3000-foot tunnel, in the face of which the hoisting station is located. The tunnel strikes the ledge 500 feet from the surface, and a shaft extends into the mine from this point. Each car of ore is weighed and sampled before being dumped in the mill. Two electric dynamos supply power at the machine shops, as well as lights for the entire mine, works and village. The machine shop is extra large and well equipped. There is a large two-story change building at entrance of tunnel, containing private room for the foreman, etc. Nearly 200 men are employed at the Shawmut. D. Dorward is Supt.; C. Jackson, foreman.

The Mammoth, Orcutt and Republican mines lie a short distance south of the Shawmut. The Mammoth has been considerably developed in years past, and possesses a 10-stamp mill, but it is now idle. Work is progressing at the Republican, however, which is controlled by the same parties, and ore will soon be taken out here and crushed at the Mammoth mill. The shaft at the Republican is down 400 feet, where considerable water was encountered, necessitating additional pumping facilities. The properties mentioned are managed by Thos. McGovern of Sonora. A. G. Keith is foreman at the mine. These mines are close to Jamestown, on the main Tuolumne river.

The Clio, near Jacksonville, has a large ledge and development work is being earnestly prosecuted. It adjoins the Republican on the southeast. The Kelley, on the northwest, belongs to the same company, composed of Boston men, represented by J. E. Potter, one of the owners, who is now in charge. A small hoist run by a horse whim will soon be replaced with a substantial steam or electric hoist. From indications now apparent, it is probable a 40-stamp mill will be put up this year. There is a splendid site for such a mill on the steep bank of the main Tuolumne river, with a good wagon road at the base of the hill. The Clio is looked upon as a coming mine.

Jamestown, Jan. 23.

(Special Correspondence).—Carters will be a point of importance, the practical terminus of the Sierra Railway, extending from Oakdale eastwardly. The West Side Flume & Lumber Co., in which the Crocker estate is a large stockholder, is building a narrow-gauge line from Carters into the timber lands of the corporation, twenty miles beyond, but the road will be used for private purposes only. It is planned to run logging trains from a heavily timbered belt of the Sierras in Tuolumne county to a large sawmill now building at Carters. One hundred and sixteen men, under charge of T. L. Hiett, chief millwright of the W. S. F. & L. Co., are building the mill. It will be 200 feet by 75 feet; daily capacity, 100 M feet. When completed a sash, door and box factory will be erected close by. The corporation owns much land of a mineral character, and there is an increasing production of sulphurets and smelting ores in the eastern belt. It is announced that an electric power and light plant is projected at Carters by the W. S. F. & L. Co.

With all these industrial advantages, Carters will not be a Paradise for tradespeople. Although there will be much business done in supplying with the necessities of life the people who will live at Carters, most of this business will be transacted by the West Side Co., which is building to accommodate its commercial department and supply its office needs. The West Side establishment will be a department store and will render precarious the existence of small stores in its neighborhood.

Carters, Jan. 20.

At the Santa Ysabel G. M. Co.'s property the new 40-stamp mill will soon be ready to begin. The new electric hoist, which will carry down 2000 feet, will soon be started. The new power drills are now in readiness and will do double the work of the old drills. Sinking on the central ore shoot has been carried down 800 feet, and sinking operations had been suspended, as with the old hoist sinking below that level was not practicable. With the electric hoist, work will be resumed, carried down 2000 feet and development of the seventh and eighth levels carried forward.

The Harvard G. M. Co.'s property is five miles north of the Santa Ysabel mine. The building for the 60-stamp mill is finished and a portion of the machinery in position. When the first twenty stamps are in position work begins. A vein of ore, 8 to 10 feet in width and assaying $8 per ton, has been found.

COLORADO.

BOULDER COUNTY.

(Special correspondence).—R. J. Walter, Supt. of the B. &. M mine, reports the sinking of the 600-foot shaft on that property to greater depth. The work goes on at the rate of 100 feet per month.

A part of Ward was destroyed by fire on the 24th. It did not reach the mills and mines just outside the town; loss, $50,000.

Ward, Jan. 21.

Twenty tons of smelting ore have been shipped from the Newmarket, the production of four men for seven weeks.

The President shaft on the Wellington group near Gold lake has been free from water and partially retimbered. The Mgr. states that he has sufficient funds to develop the property. The shaft is 130 feet deep.

DOLORES COUNTY.

The Colorado Concentrating & Milling Co. is shipping concentrates from Rico to Durango. The saving is estimated to be 85%.

FREMONT COUNTY.

Florence denies the recent locally published statement that the oil output of that district was giving out. The National Extraction Works will use coal for roasting ore where oil fuel is now used, because older customers of the oil companies require the fuel, and until the oil output can be greatly increased these companies cannot be supplied with fuel oil. The fuel oil produced at Florence is the refuse of petroleum after the illuminating oil and gasoline have been extracted that is particularly in demand by smelters and reduction works. Several years ago the oil producers could not get rid of it at 50 cents a barrel, but it is now worth nearly $1 a barrel. Four gallons of fuel oil is equivalent in roasting to a half ton of coal. It is cheaper at first cost than coal, and leaves no cinder. The oil companies are now drilling seven new wells.

LAKE COUNTY.

Chronicle: Two products are now prepared by the Leadville smelters, lead bullion, containing gold, silver and copper, and a copper matte, in which are silver and gold. It is the intention of the Boston Gold-Copper Co. to erect a converter and separator for separating the copper from the gold and silver.

To increase the matte product two new furnaces of the same capacity as the present one, 300 tons a day, will be erected at once. It is expected to have all of the new machinery installed by May 1. If necessary the pyritic smelter can then be in a position to treat 1000 tons of ore per day, and turn out a refined gold, silver and copper product, leaving a refuse slag worth less than 30 cents a ton.

SAN JUAN COUNTY.

The Sultan Mining, Smelting & Power Co. proposes to mine ores from Sultan mountain, smelt them, and produce from the water power of the Animas river electricity to light and furnish power for mines and mills in the vicinity.

SAN MIGUEL COUNTY.

The Tomboy mine output for '99 was over $600,000. The men are now working in better ground and in ore that is turning out better values than ever before.

At the Liberty Bell fifty men are pushing the mill addition and new cyanide plant to completion.

K. Benson recently sold his Butterfly mine and mill at Ames for $200,000.

SUMMIT COUNTY.

(Special Correspondence).—J. P. Lambing, formerly of California, is having built in Denver an excavator for placer work, to be used on the Blue river, where he has a tract of placer ground in which Pennsylvania parties are interested with him.

Mining Reporter: Summit county miners are enjoying a streak of luck from an unusual source. The ores from this county are in great demand on account of their rich lead contents. While the smelters refuse to accept ore from Cripple Creek unless it contains two ounces or over in gold, they are in the market for any ore from Summit county that has 20% or over of lead. The largest proportion of the ore shipped from there runs from 20% to 60% in lead, and it is richer in gold than any galena ore found elsewhere in Colorado. One shipment recently made ran 48% lead, three-fourths of an ounce gold and ten ounces silver. As ore of this grade gets a free smelting charge, the miners of Summit have a big fortune before them in this rise in the value of their ores.

The fact that the Germania lessees have to throw quartzite carrying from $4 to $6 worth of free gold over the dump because it cannot be smelted at a profit, is an argument by the Journal in favor of a custom gold mill. If there were a custom gold and concentrating mill there, they would have 3 feet of ore that could be broken at a profit, besides their high-grade streaks. A custom modern gold mill that could make a smelting grade of concentrates, in addition to saving the free gold values, would do a good business.

TELLER COUNTY.

(Special Correspondence).—The Morning Star, which side-lines with the Doctor on Raven hill, opened a rich vein of ore at 50 feet depth, some of which ran as high as $6 per pound. The property is in the hands of Sims, Reardon & Co., as lessees, and belongs to the Enterprise Co.

Cripple Creek, Jan. 20.

Pres. Williams of the Isabella G. M. Co. reports the record of the company for 1899 as follows: Total gross production of ore, $968,011.24; net smelter returns, $851,476.32; net profits of the company, after deducting all mining expenses and machinery changes, etc., $546,818.38; cash balance in banks to credit of company December 31, 1899, $476,796.06; amount paid in dividends during year, $270,000. The profits of the Isabella for 1899 amounted to 24% on the par value of the stock outstanding.

The shipments from Stratton's Independent mine for December aggregated 3150 tons; value $210,000, an average of about thirty-seven ounces per ton. The net profit was $140,000. The output for January will be larger.

Reports from the different sampling works and other treatment plants of Cripple Creek district indicate that the tonnage of high-grade ore is falling off in favor of the medium grade, showing that the big mines are disposing of large quantities of medium grade which has been stored away because of the glut at the mills.

IDAHO.

CUSTER COUNTY.

At Houston, in the White Knob Copper Co.'s smelting plant, a fourteen days' run gave twenty-two tons copper bullion. The plant has two stacks—one fifty, the other sixty tons capacity. The mine has been in operation two years. A shaft is down 700 feet and a drift run 500 feet in the direction of the ledge, which it is hoped to cut.

LATAH COUNTY.

The Gold Mountain M. & M. Co. has organized at Moscow; capital stock, $1,000,000; to develop and operate the Gold Mountain, El Dorado and Queen Hoodoo claims.

SHOSHONE COUNTY.

In eleven of the leading Cœur d'Alene mines are employed 2073 men—1357 Americans, 716 foreign born.

WASHINGTON COUNTY.

The Pacific & Idaho Northern Railroad is building from Weiser through the Seven Devils camp and has completed thirty-six miles. At Council a spur will be run in the vicinity of the Peacock and Blue Jacket mines; from Council the main line will be extended to and connect with the Northern Pacific. Fifteen carloads of ore have been shipped from the Blue Jacket mine. The ore is said to have showed copper, $80; gold and silver, $20.

MICHIGAN.

The output of iron ore from the Lake Superior region in '99 exceeded the total production of iron ore in the United States in any year prior to '98. Labor saving machinery of complete character has been introduced at mines and docks, and applied to every operatiom from digging the ore to charging the blast furnaces located more than a thousand miles from the mines. Powerful steam shovels dig the ore and dump it on the cars, run mainly by gravity to the shipping ports, where it is loaded into whaleback steamers and steel barges, then floated for hundreds of miles to the lower lake ports, and thence transported in steel cars to furnaces in Ohio and Pennsylvania. In one week during the past shipping season 173,000 gross tons of iron ore were shipped from Duluth. One dock has a capacity of 6000 tons of ore, and several of the pockets into which the ore is dumped from the cars hold 200 tons each. Thirty-eight steel steamships were required to load this ore in one week, and they averaged 5240 tons of cargo each. The ore runs directly from the ore pockets into the holds of the steamers.

The cost of digging ore and loading it on the cars at the open mines is 11 cents per ton, and the cost when delivered at the furnaces still low enough to enable the iron maker to manufacture crude iron on a great scale at less cost than is possible to make it elsewhere in the world, except, perhaps, in iron-producing districts of Alabama and Tennessee. Assuming that there will be an average production of 20,000,000 tons of iron ore in the Lake Superior region during the next ten years, it is altogether probable that the surface deposits, which have been weathered and thus prepared by Nature for economical reduction to the metallic state in the blast furnaces, will by 1910 have become exhausted. Then it will become necessary to resort to the ordinary underground mining methods. There are large deposits of lean ore in the Lake Superior region which have thus far been ignored, but will be found available when the richer ores are exhausted.

Corrigan, McKinney & Co. have secured the lease of the Ropes mine, six miles north of Ishpeming. They will reopen the mine, which is over 1000 feet deep and has produced $750,000 in gold and silver, and will rework the old tailings, estimated at 150,000 tons and carrying an average value of $4 per ton in gold and silver.

MONTANA.

Reference was made last week to the change at the Anaconda Co., from stamps to crushers and rolls, and the increased crushing capacity. For this, larger jig capacity is required and progress is being made along that line by providing greater capacity in the calcining or roasting department. Two calcining furnaces will be installed at the upper works as an experiment in that direction. The tests of efficiency made are said to give the revolving furnaces a high rating, and the calcining department may be enlarged by the addition of more furnaces of that character. Three new blast furnaces, excavating for which has already begun, will be built at the end of the present works east of the converter. There are at present six blast furnaces with a capacity of 200 tons a day each. The new ones, being about twice as large, the blast furnace capacity will be practically doubled. The product of the blast furnace is matte about 50% copper. These three furnaces will produce matte containing not less than 2,500,000 pounds of metallic copper monthly. For the accommodation of the furnaces a new building 140 feet in length and 40 feet in width is to be built and they

are expected to be ready to blow in by March 1. The Anaconda is shipping silver via Seattle, Wash., to a Chinese bank in Shanghai for Chinese coinage.

FLATHEAD COUNTY.

Work on the Snowshoe mine has been resumed. Thirty men are employed. Mgr. West says he has enough ore in sight to run the present mill for a year. The shaft is down 200 feet.

MADISON COUNTY.

E. H. Treriso, Mgr. Leiter mines, Leiterville, says the mine is looking well and that they have discovered good gold quartz.

NEVADA.

ELKO COUNTY.

A $10,000 bar of bullion and 100 pounds of cyanides have been received at Salt Lake from the Dexter mine, the result of sixteen days' run.

LINCOLN COUNTY.

The pay roll at De Lamar is $30,000 per month. The town has 1500 inhabitants.

STOREY COUNTY.

The unwaterer is still in successful operation in the C. & C. shaft. The water is now 140 feet below the level of the Sutro tunnel. There are 360 feet farther to go. Another $5000 installment was paid on the work on the 22nd instant.

WHITE PINE COUNTY.

At Ely the Ada mine has shown a copper ledge.

A nickel find is reported near the Gregory ranch in Snake valley, said to assay 15%.

NEW MEXICO.

BERNALLILLO COUNTY.

The mill for the Navaho M. Co. at Bland will have 100 stamps; a cyanide plant will be provided for the tailings. The Navaho mill, according to the plans, will have a capacity of 10,000 tons per month. If the original 100 stamps will not be able to handle this amount of ore per month an additional number will be added.

GRANT COUNTY.

(Special Correspondence).—Some time ago Messrs. Crawford, Bradley and Derbyshire put up $12,000, leased some property here, ran the mill eight months, and on January 1st had cleaned up $60,000 net profit. This was done with property that had been turned down by experts, and in the management of which others had made failures.

Silver City, Jan. 20.

OREGON.

BAKER COUNTY.

In the Baisley-Elkhorn mine, sixteen miles from Baker City, big ore shoots are opened and the Democrat declares there is ore enough in sight to feed the mill for years.

JACKSON COUNTY.

The gold output of Jackson county for 1899 is estimated at $250,000.

PENNSYLVANIA.

The Delaware, Lackawanna & Western Co. has begun closing its mines. Officials of the company declare this is done because of an over-production for market demands, but among the miners there is general conclusion that it is done for the purpose of anticipating any labor trouble by reason of the present unrest among the miners. The company has offered to deal with its employes alone, but refuses absolutely to receive any committee representing the Mine Workers' Union.

WASHINGTON.

OKANOGAN COUNTY.

(See illustrations front page.)

(Special Correspondence).—On the completion of the Northern Pacific Railway to the coast in 1893, little if anything was known of the existence of quartz lodes in the northern portion of the State of Washington which contained mineral sufficiently valuable to warrant their location or spending time or money upon them. Again at that date, unless the formation through which quartz veins ran was of a certain geological formation, all expert mining men at once pronounced them barren, or that mineral could not live in them, especially gold. However, as time passed on, some venturesome prospectors made investigations of the country and were bold enough to go against the prevailing opinion of the most eminent experts, and perhaps this class of investigators has received more encouragement from the MINING AND SCIENTIFIC PRESS of San Francisco than any other mining publication in the United States—not that that periodical or its editors and publishers did not have high regard for educated men in the mining profession, but they, as the saying is, gave hard-handed prospectors a chance, by listening to what they had to say and what they wrote, and, while in many instances the communications were not germs of diction, they were plain and to the point, and that class of articles became popular, not only with mining men, but expert mining engineers, who began picking up valuable information from men who had never looked into a work on geology. So it has come about in sixteen years that the northern portion of the State of Washington has kept pace with its northern neighbor, British Columbia, in point of discoveries of the precious metals, and today is attracting a large amount of attention from mining men and capitalists, who follow them for the purposes of investment, and the year 1899 closes with several dividend-paying mines, nearly all of which are gold producers.

In this connection Okanogan county enjoys the distinction of having the first gold-producer and dividend-payer in the State. It is located on Palmer mountain, in the northern central portion of Okanogan county, in what is now known as the Palmer Mountain district, and was named the Black Bear, which, with the War Eagle, was located by Joseph Hunter in the fall of 1887; these two claims were purchased by an association of individuals in Spokane in 1888, and the year following, with a 5-stamp mill, produced $150,000 in gold bullion, the average of the ore milled and saved on plates and vanners being $24 in gold. Differences, however, arose among the owners, throwing the property into litigation, from which it has just emerged, and a controlling interest secured by Toronto and Montreal people. During the past five months $20,000 has been expended in placing hoisting machinery, repairing the flume and mill and retimbering the shaft. By Jan. 1st, 1900, forty men will be working in the mine and the mill will be running; the first clean-up will be made by Feb. 1st. This is a brief history of the first dividend-paying mine in the State of Washington, and one that will shortly resume paying them. Naturally, at the time this property was working, it attracted much attention to this part of the country; but, it being 150 miles from rail transportation and a gold country, the Slocan, Rossland and other Northwestern camps springing up, attracting the public and railroads near them, together with the panic of the '90s, all kept the Palmer mountain country in the background; but during these dark days a party headed by John Boyd, a Loomis merchant, conceived the idea of securing a large number of claims on the south slope of Palmer mountain, extending from the base of the mountain, near Loomis, to the summit of the mountain, through which thirty well defined parallel ledges run in a northeast and southwest direction, and the running of a crosscut tunnel through them all. Not only did he conceive the idea, but he carried it out, and to-day the Palmer Mountain G. M. & T. Co. own forty-four contiguous locations and have a tunnel in 2614 feet, having cut fifteen veins, seven only of which show on the surface, and the face of the tunnel is over 1200 feet vertical in depth; the full length of the tunnel is to be 8400 feet and will give a vertical depth at the back or face of 4200 feet. It is needlsss to add that before it is completed, though continuously prosecuted, shafts will have to be sunk to give air. However, this is now provided for, as the tunnel at 3506 feet in length will cross the Black Bear vein very near the end line of the Bear location, or on the Helena Belle, owned by the Tunnel Co. The Bear is now engaged in sinking and will continue to the level of the tunnel and drift to it, taking their ore out through the tunnel; thus the first air connection is provided for. Of the fifteen veins cut in the tunnel, a thorough mining expert in the employ of one of the big corporations—the Canadian Copper Co.—states in a written report that he sampled them and that they vary in width from 5 to 42½ feet and carry ore from 12 inches to 35 feet, averaging $27.97 gold, the depth at which they have been cut ranging from 100 to 1000 feet vertical depth. This, perhaps, goes a long way toward settling the question of permanency, quality and quantity at depth. However, a Pittsburg party of gentlemen also had faith in the country, and on Mount Chapacca, directly across a small valley to the west, have been for two years developing the Golden Zone and have now 2000 feet of tunnels, four in number, one above the other, now all connected 400 feet, and have from a few inches to a full face of ore all the way down, all these tunnels being run on the vein and the depth gained 800 feet. A concentrator has just been installed with wire tram from the mine; it will start up early in January. They claim they have sent samples weekly to Pittsburg, their average values being $30 in gold, and that they can concentrate eight to ten into one.

The persistent work and good showings made particularly in the Palmer mountain tunnel has had a marked effect on the fortunes of the district, and since June 1st, 1899, the following important deals have been consummated: The Gold Hill property, involving $250,000; Wehe Con. M. & M. Co., $100,000; Paskell group, $50,000; Mariotta, $50,000; Bull Frog, $100,000; Chapacca Gold-Silver, $50,000; King Solomon, $25,000; Six Eagles, $25,000; Okanogan Free Gold, $75,000. When it is said these amounts involved, it is meant purchase price, development during bonding period and amount placed in the treasury to carry out plans made by competent mining engineers employed by the various companies.

It might also be interesting to here state that the Bull Frog has just installed a cyanide plant, they having first had their ores tested by that process, a carload, having an assay value of $19.50, giving returns of $17.50 gold and the solution contained $1.25.

The Okanogan Free Gold mines completed in October the installation of a 10-stamp mill and Wilfly concentrating tables; the run for November produced 240 ounces in gold, and the manager states he saved 50% of the values in the batteries, 37% on the plates and 10% in the concentrates, making 97% of the assay values. He also states he can mine and mill for $2.50 per ton. The gold goes about $16 per ounce, and the average is, say, a little over $8. He also states they have sufficient ore in sight for a year's run.

Perhaps it would be superfluous to further extend an article on the Palmer mountain district, Okanogan county, Wash. Let the facts speak for themselves. However, one more very imporatant fact is in evidence: not a single one of the properties mentioned in this article have asked the general public to buy their stocks; they are all owned and managed by incorporated companies, but in every instance the original subscribers to the stock have furnished the money for all purposes; further, in nearly every instance the stock has been pooled for a certain period, or until the mine was upon a dividend-paying basis. In fact, up to this time legitimate mining is absolutely the rule. JOHN I. BOOGE.

Loomis, Dec. 17.

STEVENS COUNTY.

(Special Correspondence).—Development work of Republic for December totals 3073 feet. The Gopher, adjoining the Mountain Lion to the east, has purchased the steam hoist and pump of the Bodie Co. The Bodie shaft is down 350 feet already, and a larger hoist will be required for deeper development. The Quilp mine is to have a compressor plant.

The Boundary-Republic M. Co., Ltd., capital stock $1,500,000, has been incorporated in Montreal, to operate the Quilp mine, the Valley group of three claims, east of this camp, and the Yankee Girl group of three claims in the Boundary district, three miles from Grand Forks, B. C. The Yankee Girl property has already made several smelter shipments of $30 ore to the Trail Smelter. The company control the Quilp stock and a three-fourths interest in the Valley group. The incorporators are largely stockholders in the Republic mine.

Supt. Jacklin of Capt DeLamar's Mercur mines, at Mercur, Utah, has been engaged by the Republic Con. Co. to superintend the construction and operation of the new 200-ton mill. Mr. Jacklin has had exceptional success in cyaniding complex ores, and has already made exhaustive experiments with the ore from the lower levels of the Republic mine, at the Mercur mill, before accepting the position here, and he promises as high extraction as was secured by the old Republic mill at reduced cost.

S. H. Johnson of the Johnson Pneumatic Process Co., London, Eng., is in camp, conducting experiments on Republic ore, at the instance of his own company. He has been using bromide of cyanogen in his experiments to assist the action of the cyanide, but will now use the straight cyanide in an effort to compare the respective merits of the direct cyanide and the bromo-cyanide processes. Mr. Johnson says that these roasted ores are the best he has ever seen for filtration, so far as he knows. Mr. Johnson thinks that the Republic ores can be handled for $1.40 per ton. He says he has secured 86% extraction in a three-hour treatment. An extraction of 33% of the silver values was secured and Mr. Johnson believes that this also can be increased. It is doubtful, he says, however, if the increase of extraction in the case of either the gold or silver can be carried past a certain point without increasing the expense to such an extent as to annul the profits.

One of the richest surface showings of galena yet found on the South Half has just been uncovered on the Combination No. 1 and No. 2 claims in Davis Camp. It was a Jan. 1st "jump" location, and is an instance of accidental discovery last summer on staked ground on which assessment work had not been done, and the prospector covered up his find until the first of the year, when the old location had run out. Surface assays give returns of $80 in lead and silver.

About seventy-five wagon loads of machinery have been received in camp during the past ten days, and as much more is awaiting transportation at railroad stations of Grand Forks and Marcus, or is en route to these points for Republic mines.

Republic, Jan. 15.

FOREIGN.

BRITISH COLUMBIA.

The Provincial Government has declared its intention of amending its alien exclusion law so as to hereafter permit Americans to hold claims purchased from Canadian locators. Such a concession satisfies the Americans at Atlin.

At Sandon the ill feeling between representatives of the Silver-Lead Mine Owners' Association and members of the Miners' Union, engendered by the strike, which has extended over the past eight months, has culminated in the arrest of Secretary Hegler, of the Miners' Union, on a charge of making threats against non-union miners, and conspiracy against the business interests of the mine owners. Recently there were brought from Minnesota twenty-two Finns, who have gone to work at the mine owners' rate of $3 per day of eight hours. It is charged that Hegler, as leader of the crowd of strikers, has persistently threatened the Finns.

CHINA.

The consul at Shanghai reports there is one industry especially, mining, that has hitherto been almost wholly neglected in China. In 1896 an imperial decree was issued that the mines should be worked to their fullest extent, but it availed little, since not the slightest attempt was made to introduce modern methods of mining. For centuries the Chinese extracted precious metals in the primitive, slow and clumsy method still in vogue. Foreigners have frequently tried to engage in mining, but have been thwarted by red tape. If they begin work they find the superstition of the natives an almost insuperable obstacle. That demons make their homes in mines is the firm conviction of the natives, and only by means of large bribes can their dread of the diabolical beings be dissipated. The result is that the rich mines of the country are neglected. Government employes are at work in a few copper, silver, gold and iron mines, but their labor is not very profitable, and for the very reason that they spend months at a task which miners equipped with modern machinery could perform in a few days.

MEXICO.

Chihuahua Enterprise: The conducta from the Sierras in charge of Joaquin Chavez brought sixty-two bars of bullion, total value, $143,700.

The Santa Eulalia Mining Co. has struck rich ore at a depth of 1305 feet at Santa Eulalia. A solid body of lime rock has been pierced. Drifting has resulted in finding bodies of ore assaying from 25 to 156 ounces silver, and from 11% to 32% lead.

The Mecatona Con. M. Co. is operating its gold mines, twenty kilometres south of Parral, Chihuahua. Hand samples of ore and talc taken from the Mercedes and Mecatona patios assay forty-one ounces gold and 1200 ounces silver. Settlements made with the Mexican Ore Co., Chihuahua, for ore sold them in large lots were for two and one-half ounces gold and 326 ounces silver per ton. H. L. Brown is Supt.

TASMANIA.

The last half-yearly report of the Mount Lyell Copper M. & R. Co. states that during the half year 143,686 tons of ore were mined and sent to the reduction works. The whole of the furnaces are running, Nos. 10 and 11 having been blown in during the half year, and the duplication of the converter plant has been completed. The results of this department show an increase on former output, 4592 tons of blister copper having been produced during the period, as compared with 2858 tons for the previous half year. The daily consumption of the company's ore in the No. 2 smelting plant alone frequently approaches the 100-ton mark. The No. 1 smelting plant is being chiefly confined to the concentration of first matte. Deliveries of ore from the Lyell Tharis have continued, and the directors recently exercised their option of purchasing from that company a further 25,000 tons on the same terms as before. The North Mount Lyell Copper Co., Ltd., have also commenced forwarding their ore under a contract lately entered into with them for the delivery of 6000 tons. The King Lyell Gold & Copper Co. have also forwarded ore from their mine during the half year. The total amount of purchased ore smelted was 13,017 tons. The construction of coking ovens has been undertaken at Port Kem-

bla, New South Wales, and it is expected that this year the whole of the company's coke requirements can be supplied from this source, effecting a saving on the prices hitherto paid for this fuel. The directors report that, after deducting Tasmanian dividend tax, £4478 5s., depreciation on the company's plant, £16,593, mine exploration, not included in mine preparatory works overburden account, £4686 10s 6d, the net profit for the six months has amounted to £182,596 3s 5d. These improved results are due to the increased output and the high price of copper.

THE KLONDIKE.

Vice-Consul Morrison at Dawson City says that many miners will make the trip out of the Klondike this winter down the river and to Cape Nome. While Dawson has lost in population during the past summer, it has gained in wealth. The gold output for the past year was estimated at $15,000,000, or $3,000,000 more than the preceding year, and big results are expected in the future from the introduction of steam mining machinery. United States Mail Carrier Holcombe has arrived at Eagle from Valdes, completing the first winter trip as carrier of government mail from the seat of the Yukon, a distance of 450 miles. Holcombe says he had a perilous trip. He encountered many hardships, and during the trip ten of his twelve horses died or had to be killed. He had a working force of eleven men, who were employed constructing cabins for mail stations, one created every twenty miles. From now on the department hopes to give monthly mail service between Valdes and Eagle. One consignment of mail has already come out over the new route. From the coast terminus of the trail a telephone line extends seventy-five miles inland, and it is the intention of the Government to extend the line through the Yukon next summer.

THE YUKON.

According to recent arrivals at Victoria a strike has been made on the south fork of the Big Salmon river; a number of those who were on their way from Dawson to the coast have gone to the new placers about 100 miles north of the Atlin country.

A Vancouver dispatch says: "The reports of fabulously rich quartz strikes in the north should be liberally discounted. The reported rich finds of copper-gold quartz at Great Slave lake, in which the Hudson Bay people are interested, are fictitious."

SOUTH AFRICA.

The Petit Bleau, Brussels, on the 24th inst., published the following official report of the State Engineer on the situation of the Robinson mine: When the Transvaal Government took possession of the mine the shops contained almost nothing of $123,140 of mineral entered on the books. Provisions estimated at $308,195 were found to be worth $30,750. It will be two years before the mine can be worked again.

Censored Johannesburg advices of the 19th ult. say that eight mines are being worked by government orders, five of them under the direct control of government officials. These eight are the Village Main Reef, Wemmer Gold, Ferreira, Robinson, Bonanza, Rose Deep, Pioneer and Worcester. The gold output for September was 426,556 ounces. This was from sixty-six Rand companies and eight companies outside. The output for October was about 18,000 ounces during the period subsequent to the declaration of war. The State Mining Engineer, J. B. Munnik, has made his headquarters at the Robinson. His running expenses are less per ton than under the former management. He has opened the Robinson foundry, and is able not only to do the mining work, but contribute largely to the expenses for the Army Department. When the mines were first taken over, it was found that many important parts of the machinery had been damaged or hidden, but these difficulties were overcome. There are now 10,000 natives and 4000 whites employed in the mines, and other mines are being opened as fast as men can be organized. Mine managers and others seem to have been under the impression that the stoppage would only be a matter of weeks, and no attempt appears to have been made to make arrangements for the care of the machinery or the underground workings. Large quantities of valuable property had been secreted in the mines—personal effects, provisions, pianos, buggies, paintings, etc. Many such things were only discovered just in time, when the water had reached to within a few feet of them. There were also discovered quantities of arms and ammunition, and the Government claims to have made many important discoveries that will be of use to them in due course. Although the books of many companies were removed, prior to the outbreak of war, to Capetown and Durban, an enormous quantity of documents has been overhauled by government-appointed experts, who are now preparing a report which is "to create the greatest sensation of modern times." A large number of mines are filling with water, owing to pumping being stopped. As the rainy season is now on, water is making at a great rate, and in a short time the pumps will be drowned out and much damage done. The Minister of Mines has been holding interviews with the representatives of the companies as to starting pumping. A number of miners declare that French and German shareholders control the majority of the stock, and that they should, therefore, be permitted to pump. The Government is not in favor of having many foreigners in the country, and all the burghers are required to meet the English. The problem is a difficult one. Apart from the labor problem itself, it is debated as to whether the labor that might possibly be devoted to pumping might not be more profitably employed in growing food, inasmuch as it is considered that there is abundance of money in hand, both here and in Europe, for all necessary purposes.

Personal.

H. C. WOODROW has returned to Redding, Cal.

BYRON E. SHEAR has returned to Denver, Colo., from the East.

GEO. H. EVANS returns to Summit county, Colo., about Feb. 1st.

J. F. MEIKEL is the new Supt. Red Boy Con. M. Co., Baker City, Or.

JULES DE TILIA, a professional prospector, has gone to northern Idado.

R. B. THOMAS has assumed charge of his new smelter at Cerrillos, N. M.

CURTIS H. LINDLEY has returned to San Francisco from Grass Valley, Cal.

W. H. COMBS, of Denver, Colo., has been in Boston, Mass., on mining business.

F. BLACKFORD, of Butte, has been elected president Montana Society of Engineers.

WM. STEPHENS is building a 60-stamp mill for the Harvard G. M. Co., at Jamestown, Cal.

H. H. SNEDIGER, of Denver, Colo., recently returned from the Lake Superior copper regions.

H. B. UNDERHILL, JR., Sec. Selby Smelting & Lead Works, San Francisco, is in Honolulu.

WM. BUCKINGHAM, of Chicago, representing Fairbanks, Morse & Co., is at Williams, Ariz.

CAPT. W. M. JAMES has given up his intended South African trip and will return to California.

J. R. MAGRUDER, Mgr. New York & Sonora Mining Co., has returned from Denver, via Nogales.

E. K. GESFORD, a Colorado miner and prospector, is inspecting mining property in the vicinity of Redding, Cal.

GEORGE A. ANDERSON, American Mgr. MacArthur-Forrest cyanide process, from Denver, is in Salt Lake City, Utah.

T. E. FARISH is developing the Whipsaw Copper Mining Co.'s property at Castle creek, Yapavai county, Ariz.

W. G. CAMPBELL and H. B. Gillespie have formed a partnership in Denver, Colo., to engage in the mining business.

CHAS. BROCKINGTON has resigned the superintendency of the Omaha, Lone Jack and Homeward Bound mines, Nevada Co., Cal.

EDGAR RICKARD has returned from London, and is in Berkeley, Cal. He will examine some California mining property next month.

A. W. HOLT, of the Kearsarge mine, Columbia, Tuolumne county, Cal., is in San Francisco to buy a 10-stamp mill for that property.

J. D. FEE, of Pueblo, Colo., who has finished building the El Paso mill, Elizabethtown, N. M., is examining California mining property.

JOHN HOFFMAN has been appointed superintendent of power at the Keswick, Cal., smelter, succeeding J. J. Jones, who recently resigned.

J. B. GRAHAM, who was employed in this office in 1860—just forty years ago—is now publishing the Bulletin, at Bingham Canyon, Utah.

COL. A. R. BRODIE, formerly of the Rough Riders, is in Phœnix, Ariz. He is now operating gold and copper properties thirty miles from Prescott.

JAS. CREIGHTON, formerly of the Bunker Hill & Sullivan mines in the Cœur d'Alenes, succeeds Mark Hopkins as Supt. of the Tesora M. Co., Utah.

G. H. HILL, of the Co-operative Mining Syndicate, Seattle, Wash., goes to Amalfi, U. S. of Colombia, S. A., to operate mines there for his company. Like every other miner everywhere throughout the world he has this paper follow him.

JOHN T. DONNELLAN, who is operating copper properties at Ray, Riverside district, Ariz., is endeavoring to enlist municipal support in building a road to Phœnix.

F. S. ROUMAGE, of Auburn, Cal., goes on the 1st prox. as Supt. Omenica M. Co., operating on the Naas river, B. C., the property to be worked by hydraulic elevator.

C. P. SCHUMACHER and W. L. Cooper, formerly of Leadville, have formed a partnership to engage in the mining business, with offices in the Jacobson Bldg., Denver, Colo.

P. J. COLE, ex-mayor of Phœnix, Ariz., in conjunction with Goodwin brothers of Globe, is opening up some copper properties some twelve miles from Ray camp on Mineral creek.

V. N. MCGEE, a Stanford, Cal., graduate from the department of civil engineering, has been appointed professor of civil engineering in the Imperial University at Tientsin, China.

EX-U. S. MARSHAL LONG of San Francisco is in Tuolumne county, Cal., interested in mining development at Tuttletown, where his company is about to install a 20-stamp mill.

R. B. STANTON is superintending for Eastern men the development of placer mines on the Colorado river. He made a trip through the Grand Canyon of the Colorado two years ago.

P. T. FARNSWORTH succeeds Jas. A. Cunningham as Pres. and Mgr. Bullion-Beck, Utah, M. Co., the former having control of the stock. Kent Farnsworth succeeds Jno. A. Kirby as Supt.

J. W. BENNIE, Supt. of the smelters for the Mt. Copper Co. Ltd, Keswick, Cal., has started on a visiting tour to the smelters of Australia, expecting to return via New York on an inspection trip to the smelters of the United States.

T. W. GOAD is in Denver, Colo., from London, Eng., on a trip to Montana for his company. He expects to be able to put through a deal for the Bannack placers and has an option on a group of low-grade gold mines in the Feather river district, Oregon. He says: "The only trouble I find in this country is the high prices at which good mining property is held. The mines are here and the British investing public would like to get them, but the prices are frequently put out of the reach of legitimate investors."

Catalogues Received.

Whether it be a catalogue or a gas engine, the Union Gas Engine Co. of San Francisco always produce a good article. Their latest catalogue, No. 13, is an illustrated pamphlet of 66 pages, devoted exclusively to marine engines, and tells any one interested in that class of machinery about as much as he would ordinarily want to know concerning marine engines. There isn't much technical detail or description, but there are 55 pages of fine engravings, illustrating different sizes and styles of marine engines made by the firm, and showing the vessels propelled by their motors, the capacity, the name of the vessel, where it is plying, who owns it, etc. The waterscapes and landscapes thus portrayed are works of art, and the whole thing gives an excellent idea of the capacity and usefulness of these engines. The Union Gas Engine Co., 244-246 First St., San Francisco, will send one of these handsome catalogues to anywhere on request.

Recently Declared Mining Dividends.

Buffalo Hump, Idaho, M. Co., first dividend 1%; payable Feb. 1.

Quincy, Mich., M. Co., semi-annual dividend $5 per share; payable Feb. 15.

La Bufa, Sonora, Mexico, $500 per share; Jan. 1.

Boston & Montana Co., Mont., regular quarterly dividend $5 per share, and $3 extra; payable Feb. 20.

Consolidated Gold Mines Co., Colorado Springs, Colo., 1 cent per share, $10,000; Jan. 25.

Modoc G. M. Co., Cal., 1 cent per share, $5000; Jan. 22.

Books Received.

"Power Transmitted by Electricity," octavo, pp. 240, illustrated, written by Philip Atkinson, second edition revised and enlarged, discussing principles of the electric motor, applications of the stationary motor, station construction and equipment—a work in which primary instruction and more advanced technical requirements are supplied. Published by the D. Van Nostrand Co., 23 Murray St., N. Y. City, $2.

Industrial Notes.

—The Colorado Iron & Fuel Co. will have a $25,000 display at the Paris Exposition.

—The bondholders of the San Joaquin, Cal., Electric Co. will construct a large reservoir in Crane valley, Cal., to cost $40,000.

—On export bills of lading and receipts issued by carriers from the United States by rail to Canada and Mexico a 1-cent revenue stamp is all that is required.

—It costs more to get a ton of freight from San Diego to Chicago, 2265 miles, than to Hongkong, 7000 miles; $34 to $38 to Chicago; to Hongkong $8 to $10.

—W. H. Holabird, of Los Angeles, Cal., goes to Washington to arrange for the emigration of a colony of 14,000 people from Russia and 11,000 from Canada.

—The United States Government has assurance from Costa Rica and Nicarauga that they are willing to lease territory to the United States for 100 years, if necessary, for the construction of the Nicaragua canal.

—Colorado members of Congress will try to have the Government place a geologist and mineralogist at the United States Mint in Denver to examine and determine the nature of the different ores discovered throughout Colorado.

—Stockholders of the Consolidated Kansas City Smelting & Refining Co. will hold a special meeting in New York on February 2nd, to consider a proposed reduction of capital stock of the company from $4,500,000 to $2,500,000.

—At the annual meeting of the Giant Powder Co. in San Francisco on the 24th the financial statement showed net profits of $209,868.04 in fourteen months, payment of $119.976 in dividends, a net surplus of $89,893.04, and assets of $1,269,838.71.

—Arrangements have been made by the Canadian Postal Department to carry a limited quantity of newspapers to Dawson and Atlin during the winter months. To Dawson the quantity is limited to 500 pounds per week, and to Atlin 300 pounds semi-weekly.

—Gen. Greely, of the Signal Corps, has shipped to San Francisco $50,000 worth of material to be used in establishing the army telephone and telegraph lines in the Philippines. The shipment will consist of miles of wire, telegraph and telephone instruments, batteries and other things which go to make up a complete equipment for telegraph and telephone stations. The material will reach Manila in March, Col. Allen, who is in charge of the Signal Corps in the Philippines, will perfect a system of communication.

—Yreka, Cal., wants water works of the capacity of 1,000,000 gallons daily. .Present daily consumption, 250,000 gallons. Cast iron pipe will weigh as follows: 10-inch, 62½ lbs per foot, $2.15 per foot; 8-inch, 45 lbs, $1.60: 6-inch, 30 lbs, 1.10; 4-inch, 19½ or 20 lbs, 75 cts; 3-inch wrought iron, 55 cts, and 2-inch, 30 cts; 15-inch No. 14 steel, $1.15; 12-inch, No. 14, $1; 12-inch No. 12 steel, $1.25. Wooden pipe: With head to 40 feet, 75c per foot; 40 to 50 feet, 81c; 50 to 60 feet, 88c; 60 to 70 feet, 95c; 70 to 80 feet, $1.02; 80 to 90 feet, $1.09; 90 to 100 feet, $1.16.

—Russia is using American manufactures as the best and cheapest in the world. She has bought thousands of tons of steel rails for the Siberian railroad, 300 locomotives, and several warships. In the Transsiberian railroad Russia has invested over $300,000,000. The line is now complete from St. Petersburg to the Amour river, and will be finished in eighteen months. Siberia, with a scattered population of 5,000,000, is equal in area and resources to Canada and the United States, and offers a market for American enterprise. Russia welcomes American capital, placing hardly any tariff restrictions on imports and is arranging for an American-Russian exhibit to follow the Paris exposition.

—The new masonry and concrete drydock at Mare Island, Cal., will be the largest of the kind upon the coast, and capable of taking the largest battleship. Dimensions: Length on coping from head to outer end of table, 772½ feet; length on coping from head to outer gate sill, 750 feet; length on floor from head to outer gate, 719 feet; width on coping in body, 141½ feet; least width on floor of body, 80 feet; width at entrance at mean high water level, 101 feet; depth from coping to floor in body, 38½ feet; depth over sill at mean high water, 30 feet. There will be 30 feet of water at the entrance and 8 feet more inside. Cost about $1,200,000. The pumping plant will consist of three centrifugal pumps and six tubular boilers; capacity 125,000 gallons per minute. The steel caisson to close the entrance to the dock will be 105⅝ feet long, 22 feet wide, depth from the bottom keel to under side of upper deck 35¾ feet.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING JAN. 16, 1900.

641,360.—AMALGAMATOR — L. H. Barricks, S. F.

641,359.—ORE SEPARATOR — J. Barron, S. F.

641,490. — LIFTING JACK — A. Bauer, Boyd, Or.

641,362. — HOISTING APPARATUS — H. Behr, S. F.

641,367. — TURNING MECHANISM — G. Breuer, Sacramento, Cal.

641,271. — PIPE WRENCH—J. H. Condy, Stockton, Cal.

641,451.—WRENCH—W. T. Hatton, Canyon City, Or.

641,393.—MEAT HANGER—W. O. Johnson, Seattle, Wash.

641,597.—WATER HEATER—C. S. Kinney, Arroyo Grande, Cal.

641,317.—TOOL HOLDER — R. S. Moore, Oakland, Cal.

641,531.—COMB — W. P. Murphy, San Jose, Cal.

641,606.—MIXER—V. J. A. Rey, S. F.

641,555. — GAS GENERATOR — A. F. Shriver, Arbuckle, Cal.

641,558.—OIL BURNER—S. Spillars, Pomona, Cal.

641,652. — EXTRACTING GOLD — A. G. Stephens, Los Angeles, Cal.

641,419. — AGITATOR — H. C. Wheeler, Winchester, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ELECTRIC AMALGAMATORS. — L. H. Barricks, San Francisco, Cal. No. 641,360. Dated Jan. 16, 1900. This invention relates to a device for separating gold and silver from pulp and ore with which they are associated. The object is to provide a means for increasing the activity of amalgamation of metals which can be thus effected. It consists of a metallic frame or body having a perforated plate secured to its bottom, a porous plate resting upon the metal plate forming a bottom upon which the mercury is placed, a pan or box upon which the frame or body is supported, adapted to contain a saline solution, a sluice connected with the frame above the porous plate and having a copper plate in the bottom dipping into the mercury and serving as a negative pole of an electric circuit, and a plate in the pan or box serving as the positive pole.

FRICTION WHEEL GRIP FOR ORE FEEDERS.—C. D. Hooper, Telluride, Colo. No. 641,390. Dated Jan. 16, 1900. This invention is designed to provide a friction wheel and gripping device which is connected with ore feeders so as to advance the latter by small impulses, and thus regulate the feed of ore from the hopper or receptacle to stamp or crushing mill. The wheel has a central web and flange extending some distance on each side thereof. A rectangular yoke of sufficient width encloses this flange and extends inwardly upon each side, and a block having approximately the width of the flange of the wheel is introduced between the flange and the inner wall of the cross bar of the yoke. Independent blocks are confined between the inner arms of the yoke, and the inner periphery of the flange by stub-bolts, and have a curvature substantially corresponding with that of the flange. The blocks rock on the bolts, and are caused to bind against the flange of the wheel when the lever arm of the yoke is moved in one direction, and they slip so as to allow the yoke to be moved with relation to the wheel when moved in the other direction. This movement is effected by connections, so that the falling of the stamp causes the tappet to act upon the lever arm connections and thus move the feed device.

TRUSS.—W. R. Close-Erson, Onehunga, New Zealand. No. 641,372. Dated Jan. 16, 1900. This truss is designed for the treatment of various forms of hernia, to minimize the discomfort and facilitate easy application and uniform pressure on the part or parts of the patient being treated, and a means for increasing or decreasing the pressure as circumstances require. The truss consists of a continuous flexible exterior covering, and a continuous hollow flexible tube which is adapted to be inflated. A stiffening and shaping plate occupies one side of the truss and pad, and is interposed between the inside tube and the exterior covering. By means of a belt and suitable connections these parts are properly supported.

Latest Market Reports.

SAN FRANCISCO, Jan. 25, 1900.

SILVER—Per oz., Troy: London, 27⅛d (standard ounce, 925 fine); New York, bar silver, 59⅝ cts. (1000 fine); San Francisco, 59⅞; Mexican dollars, 48½c.

COPPER. — New York, Lake, $16.50; electrolytic, $16.00; casting, $16.12½; St. Louis, $16@16.25; San Francisco, 17¼@18. Mill Copper plates, 23½c; bars, 25½@27c.

LEAD.—New York, $4.70; St. Louis, $4.75; San Francisco, $4.75; pipe 7½, sheet 8½, bar 6½c. London, Soft Spanish Lead, £16 2s=4.43c per lb.

SPELTER. — New York, $4.55; St. Louis, $4.50; San Francisco, ton lots, 5½c; 100-lb lots, 6¼c.

ANTIMONY. — New York, 9¼c; San Francisco, 1000-lb lots, 10c; 300 to 500 lbs., 11@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 3, 6½c.

IRON. — Pittsburg, American soft, $25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c.

STEEL.—San Francisco, bar, 12c to 20c per lb.

QUICKSILVER. — New York, $52.25; London, £9 14s; San Francisco, local, $52 ℔ flask of 76½ lbs.; export, $47.50.

PLATINUM.—San Francisco, crude, $14 ℔ oz.; manufactured, $19@22.

FERRO-MANGANESE. — San Francisco, ℔ ton, $30.

ZINC.—San Francisco, 5¾; slab, 6½c; bar, 8.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

TIN.—New York, pig, $27.50; San Francisco, $29; bar tin, ℔ lb, 35c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 40c to 50c.

NICKEL.—New York, 40@45c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.80 50-lb lots; San Francisco, $2.50 to $3 lb lots.

CANDLES.—Granite 6s, 16 oz.,40s., 11½c; 14 oz., 40s., 10½c.

FERRO-TUNGSTEN.—New York, 60c; San Francisco, 75c (60%).

MAGNESIUM.—New York, $3.50 ℔ lb.; San Francisco, $4.50.

TUNGSTEN.—New York, ℔ lb., 75c; San Francisco, 90c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs' $10.05; Colorado Anthracite, $14.50.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 34@36c ℔ lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, 1¼c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2¾c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, strictly pure, boiled, bbl., 66c; cs., 71c; raw, bbl., 64c; cs., 69c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 61c; cs., 66c; raw, bbl., 59c; cs., 64c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 20c; Astral, 20c; Star, 20c; Eocene, 22c; Extra Star, 24c; Elaine, 25c; Water White, bulk, in tanks, 14c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 55c; cs., 60c; No. 1 bbl., 45c; cs., 50c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 65c; No. 1 bbl., 52½c; cs., 57½c.

San Francisco Stock Board Sales.

SAN FRANCISCO, Jan. 25, 1900.

9:30 A. M. SESSION.

500 Belcher.....12c	100 Ophir.....71c
100 Challar.....29c	200 Overman....7c
200 C. C. & V.$1 65	300 Potosi.....37c
100 G. & C.....26c	100.....38c
200 Mexican.....35c	300 Union.....32c
300 Occidental...19c	200 Y Jacket....25c

2:30 P. M. SESSION.

200 Ophir.....69c	100 Potosi.....36c
200.....68c	200.....37c
400 Mexican....32c	100 H. & N.....39c
400 G. & C.....23c	100 Crown P't...13c
600 B. & B.....25c	100.....14c
400 C. C. & V.$1 55	200 Y. Jacket...24c
300 Savage.....16c	100 Overman....16c
200 Challar.....29c	500 Union Con...30c

SITUATIONS WANTED.

A YOUNG MAN WITH SEVERAL YEARS' practical experience in drift and hydraulic mining, especially hydraulic elevating, is open for engagement to manage or superintend works of this kind. Reference best in the State. Address J., care of Mining and Scientific Press.

Mining Engineer and Metallurgist, technically educated, with fifteen years of practical experience, is open for a new engagement as expert or superintendent. Specialty the treatment of rebellious silver and gold ores. Experienced in designing, building and running reduction works. Speaks and writes Spanish fluently. Address ALPHONSE BENO, P. O. Box 814, City of Mexico.

Position Wanted

By Experienced Metallurgist and Mining Engineer, preferable in charge of a cyanide plant or as chemist and assayer. Thoroughly familiar with all processes for gold extraction. Technical graduate. Best of references. Salary moderate. Address W. C. A., care this paper.

WANTED.

WANTED—A Second-Hand White Howell Roaster, also a Revolving Drier.

Must be in good repair. Address ARTHUR HENDEY, Agent, Copper Chief Mining Company, Jerome, Arizona.

WANTED.—Party with Capital to Develop Good Quartz Claim.

Has 40-foot shaft; lead 4 feet; free gold. Address ELMER BONNER, Kings River P. O., Fresno Co., Cal

Wanted.—Foreman for Twenty-Stamp Mill.

One hundred and fifty dollars per month and board. Address THE WM. HAMILTON MFG. CO., 316 S. Euclid Ave., Oak Park, Illinois.

WANTED.—A STAMP MILL MILLWRIGHT.

Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

Hoskins' Patent Hydro-Carbon Blow-Pipe and Assay Furnaces.



No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO

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DEWEY, STRONG & CO.,

PATENT AGENTS, 330 Market St., S. F., Cal.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage. **Money** loaned mines, **Mining** companies organized, their property exported, financed and managed. **Mines,** prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated. **Examine** mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and Chemical work done. **EDW. N. BREITUNG,** Marquette, Mich., U.S.A. CABLE ADDRESS, EDBEE. CODES: LIEBER'S, BEDFORD MCNEIL'S, A B C UNIVERSAL COMMERCIAL.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

Experienced Mining Engineer (age 40) reports on mines and their economical development; ore dressing; processes; mining machinery and mill construction. References. P. O. Box 971, Denver, Colorado.

FOR SALE.

FOR SALE.—DIVIDEND-PAYING, HYDRAULIC placer. Extensive deposits. Old channel gravel, water, pressure, grade, dump, and gold. Rigid investigation invited. Thoroughly legitimate. Banking references. Owner. IDAHO, care of Mining and Scientific Press.

Mines for Sale.

A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.

H. E RUNKLE, Mining Broker, El Paso, Texas.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

A BARGAIN.

3500 feet of 16-inch, 5 B. W. G. National Tube Works seamless pipe. Kimberly joints. Immediate delivery.

Address PIPI, Room No. 140, No. 32 Broadway, New York City.

FOR SALE.

40-lb. Relaying Rails with Plain Plates. 2 Broad Guage Locomotives.

CORRESPONDENCE SOLICITED.

C J. TALLON,

308 Market Street, San Francisco, Cal.



FOR SALE.

Relaying Rails

For Mines and Street Railways.

LEE CHAMBERLAIN & CO.,

155 North Main St., LOS ANGELES.

STOCKHOLDERS' MEETING.

Notice of Stockholders' Meeting of the Union Hill Consolidated Mines.

In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated Mines, a meeting of the Stockholders of this Company will be held at 11 o'clock in the forenoon on Tuesday, the 27th day of February, 1900, at its principal office, 320 Sansome St., room 24, San Francisco, California, to consider and vote upon the proposition to increase the Capital Stock of this Company to four hundred thousand ($400,000) dollars in 400,000 shares at the par value of One Dollar each.

JOSEPH H. MOOSER, Secretary.

Dated San Francisco, January 15th, 1900.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from J. F. Cowdery, in the Lucky Point Mine, near St. Louis, Sierra Co., to deposit tailings in a worked-out pit; from Chas. S. Diesem, in the Riffle Point Claim, at Grass Flat, Sierra Co., to deposit tailings in Grass Flat Ravine; from Morris J. Williams, in the Weeds Point Mine near Camptonville, Yuba Co., to deposit tailings in a ravine; and from E. A. Moody, in the Inskip Placer Mine, at Gold Run, Placer Co., to deposit tailings in Squires Ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 29, 1900, at 1:30 P. M.

Quicksilver

——FOR SALE BY——

The Eureka Company,

OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

Wealth Producers.

Copper mining has been more profitable than any other business undertaking.

STATISTICS SHOW THE GREAT RESULTS. WRITE FOR PAMPHLET.

COLONIAL COPPER COMPANY, 32 Broadway, N. Y.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,

ASSAYERS AND WASTE PRODUCT SMELTERS, 1661 Larimer St., Denver, Colo.

Write for Donaldson's Assayers' Slag Hammer.

"SMOOTH ON" CASTINGS.

An iron cement in powdered form, for repairing leaks or fractures in steam or hydraulic work, applied by mixing with water; hardens quickly and expands in hardening. When hard it will with stand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,

34-36 STEUART ST., SAN FRANCISCO, CAL.....AGENTS FOR PACIFIC COAST.

STEAM LOCOMOBILE FREIGHTING TRAIN.

CAPACITY OF WAGONS 16 TONS EACH, or total freight carrying capacity of train 50 tons.



CAPACITY OF ENGINE, 50 H. P.

THESE WAGONS ARE ESPECIALLY DESIGNED FOR STEAM FREIGHTING.

CAPACITY OF TRAIN, 50 TONS.

"The Daniel Best" 50-Horse Power Traction Engine.

The most powerful and only Successful and Practicable Road Engine in the world. Eighty of them in use on this Coast. They are being Successfully and Profitably Employed in Hauling Logs, Lumber, Ore, Salt, Borax and other kinds of freight.

The work is being done **FIFTY PER CENT** Cheaper than it is possible to do with Animal Power. They can be operated over any ordinary road where it is practicable to use mules or horses, doing the same work. They can ascend grades as much as 10% to 20%, hauling their loads of 35 to 40 tons, depending upon the condition of the roads; loads may be increased to even greater amount on a firm and moderately level road.

Send for descriptive Circulars and Price List of Engines and Wagons. We solicit correspondence. No trouble to answer questions.

Estimates made for complete Steam Freighting Outfits. Address

THE BEST MANUFACTURING CO.,

San Leandro, Cal., U. S. A.

Westinghouse Mine Locomotives.

Mine Hoists.

Alternating and Direct Current Motors.

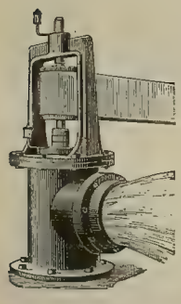
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Wood's Propeller Pump

Stands pre-eminent. No gearings, valves, cylinders, plungers, exposed bearings or packings. There is economy, convenience and rapidity in sinking with this unique and reliable pump. Send for Catalogue.

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31 MAIN STREET - - - - SAN FRANCISCO, CAL.

GENERAL ELECTRIC COMPANY,

SAN FRANCISCO, CAL., Claus Spreckels Building.

DENVER, COL., Kittredge Building.

PORTLAND, OR., Worcester Building.

SALT LAKE CITY, UTAH, Templeton Building.

— MANUFACTURES THE —

Standard Electric Mining Apparatus

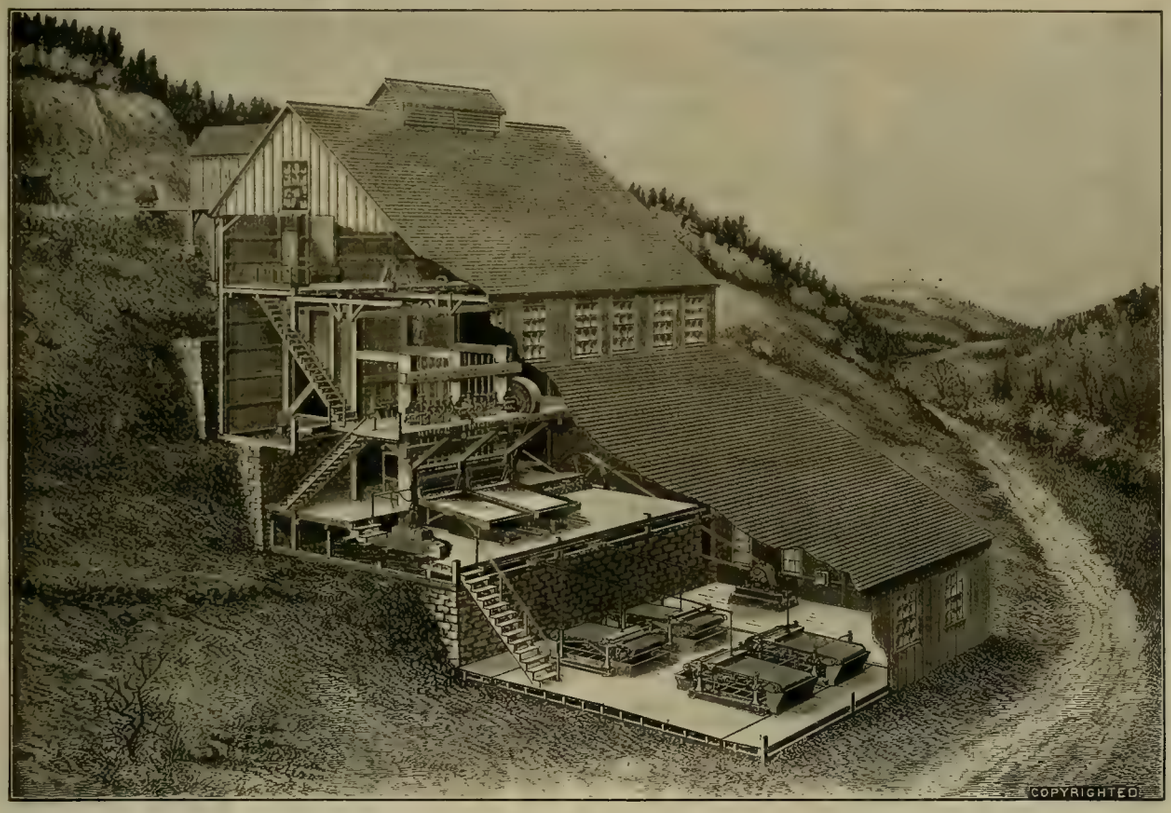
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Mines Operated by Our Apparatus are Operated Economically, Safely and Satisfactorily.

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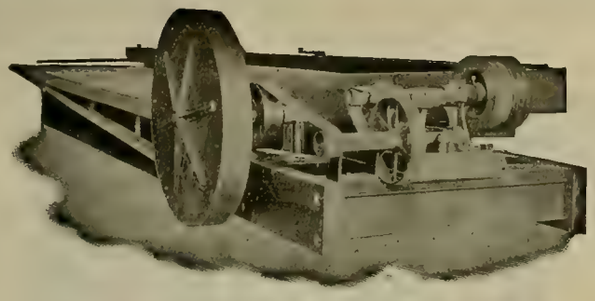
The above is an illustration of a First-Class Modern 10-Stamp Gold Mill. For particulars, send for Catalogues.

Builders of All Classes of Mining Machinery.

Sole Pacific Coast Agents and Builders of the Celebrated

WILFLEY CONCENTRATOR.

Over 2000 in Use.



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The Wilfley Table is fully covered by U. S. patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

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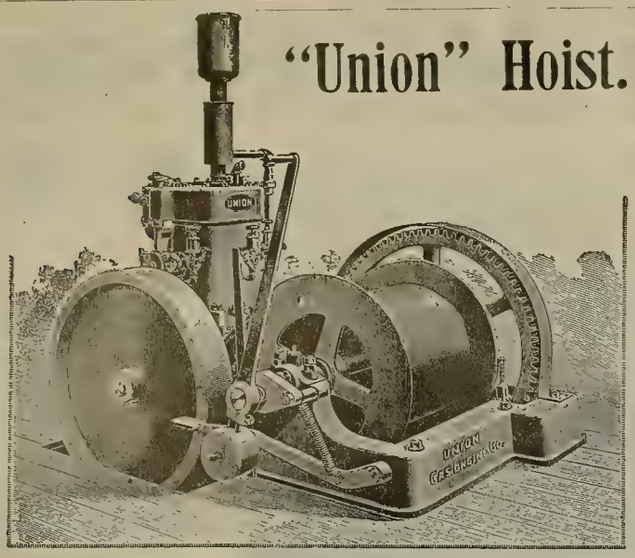
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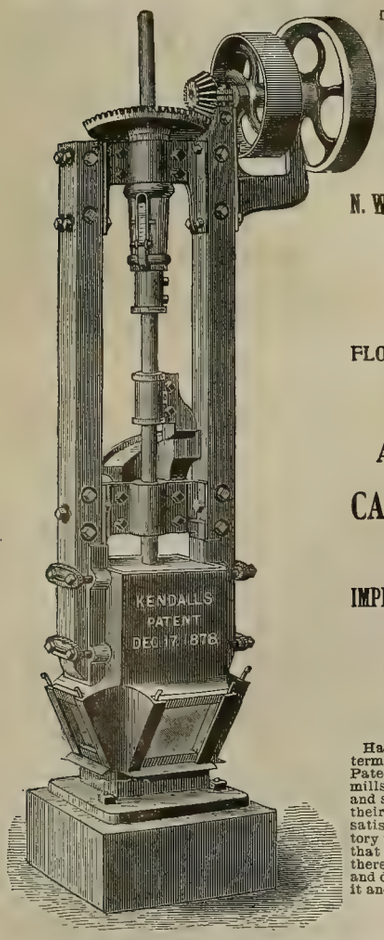
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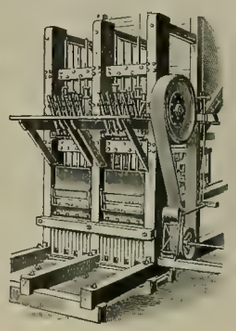
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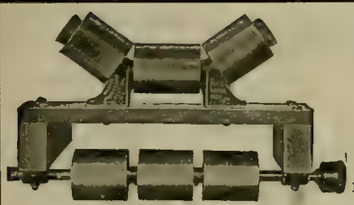
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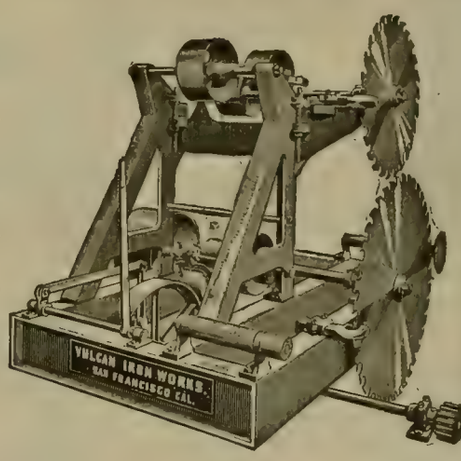
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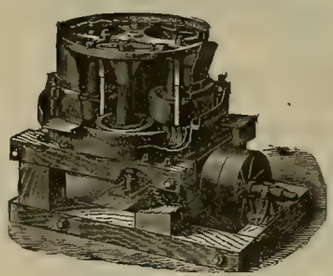


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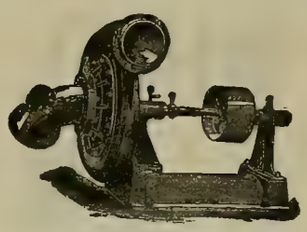
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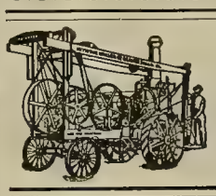
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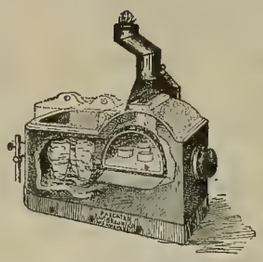
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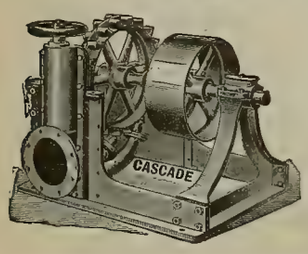
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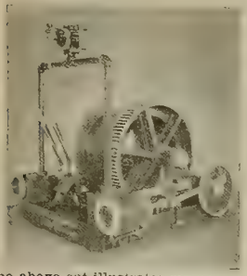
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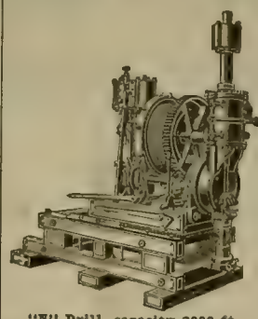
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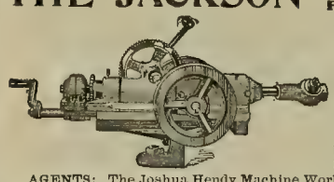
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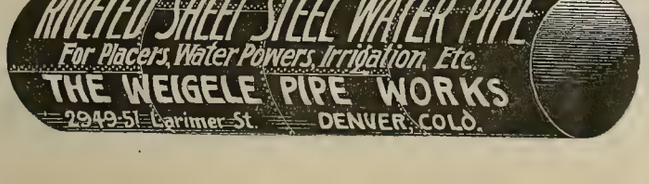
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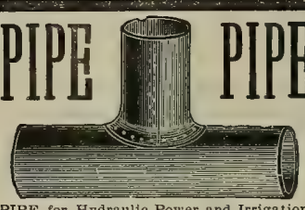
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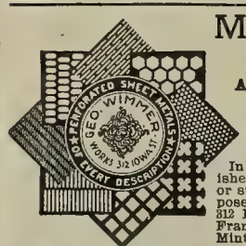


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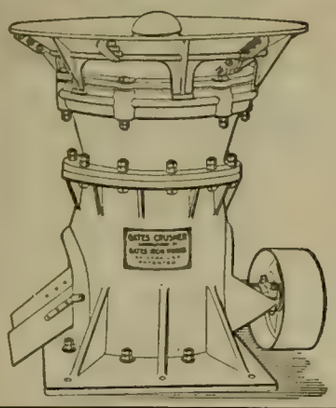
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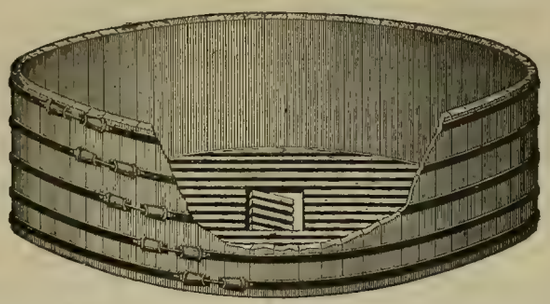
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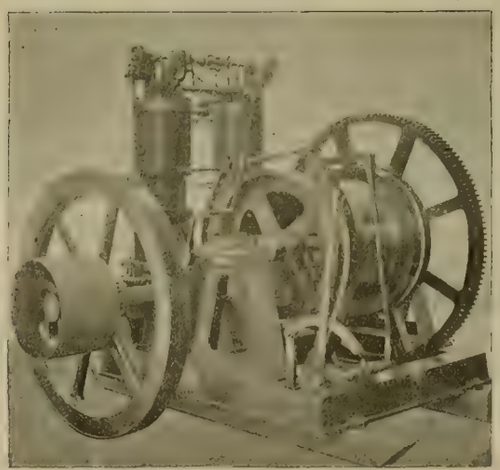
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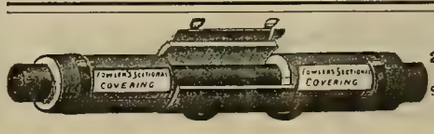
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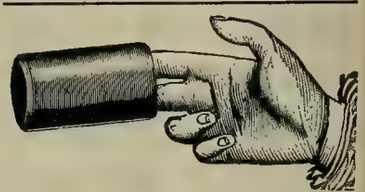
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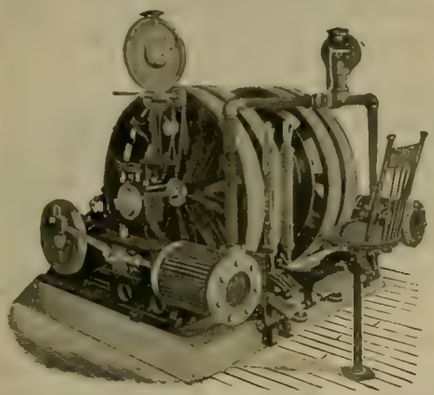
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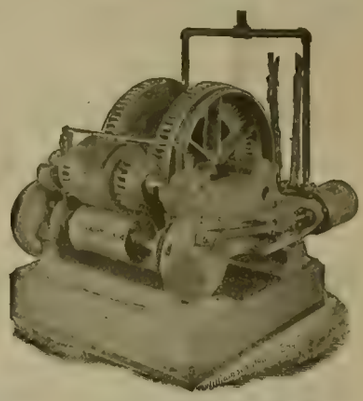
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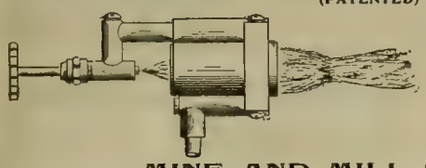
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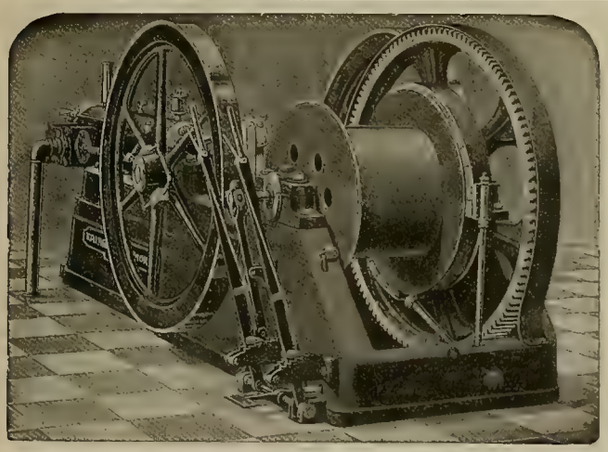
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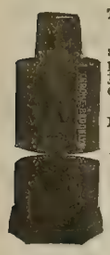
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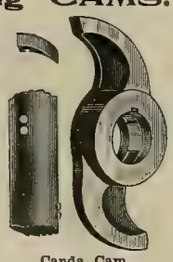


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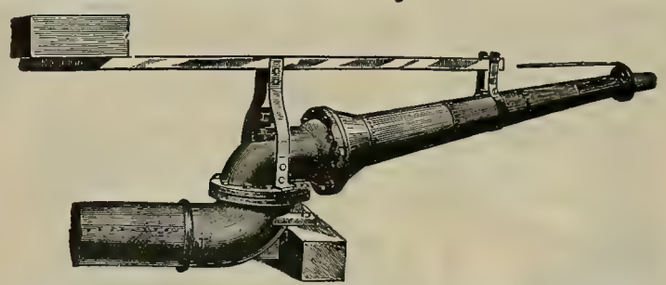
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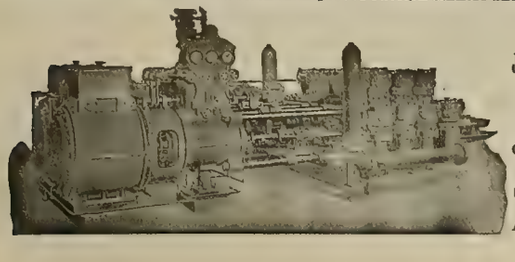
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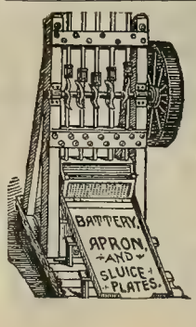
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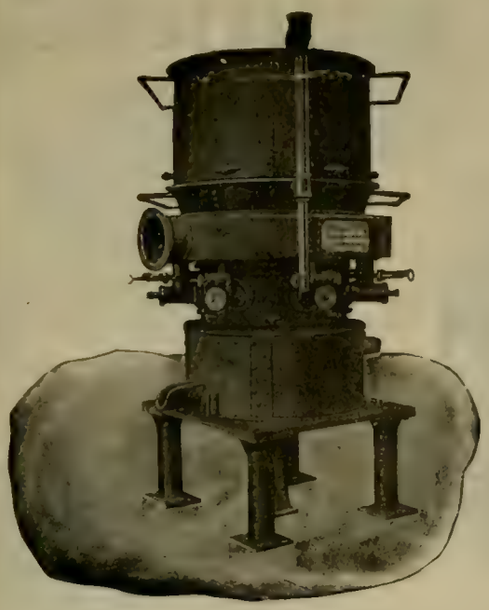
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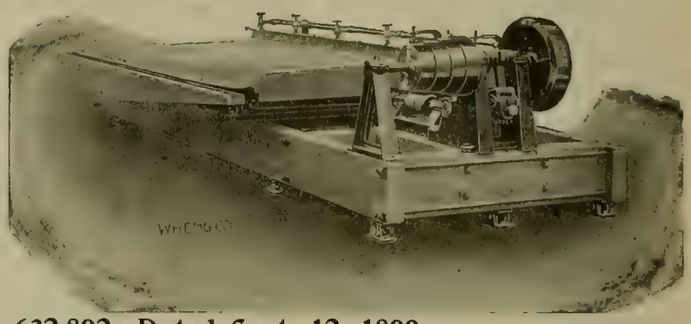
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Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of December, 1899, an assessment (No. 22) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 27th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 22) has been postponed to THURSDAY, the 1st day of February, 1900, and the day of sale from the 27th day of January, 1900, to SATURDAY, the 17th day of February, 1900.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office, Room 31, No. 214 Pine street. San Francisco. California.

SOUTH PALOMA GOLD MINING COMPANY, Limited.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Directors, held on the 6th day of December, 1899, an assessment (No. 1) of six-tenths (6-10) of a cent per share was levied upon the capital stock of the corporation, payable immediately to the secretary, John F. Barnett, at Room 22, No. 222 Sansome St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3rd day of February, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on the 19th day of February, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

JOHN F. BARNETT, Secretary.

Room 22, No. 222 Sansome St., San Francisco, Cal.

QUINCY MINING AND WATER COMPANY.—Location of principal place of business, San Francisco, California; location of works, Spanish Ranch, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of January, 1900, an assessment (No. 2) of forty cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 439 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of February, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 5th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

THOMAS QUIGLEY, Secretary.

Office—No. 439 California street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of January, 1900, an assessment (No. 10) of five cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of February, 1900, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 5th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco. California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of January, 1900, an assessment (No. 22) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

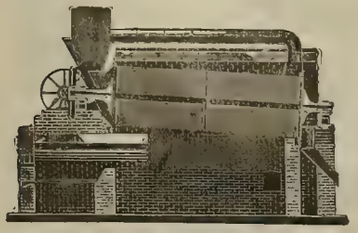
Any stock upon which this assessment shall remain unpaid on the 27th day of February, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 19th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

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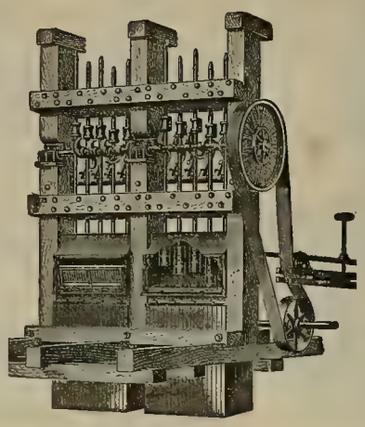
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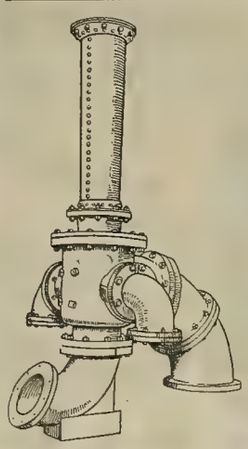
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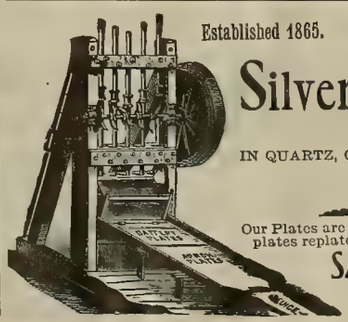
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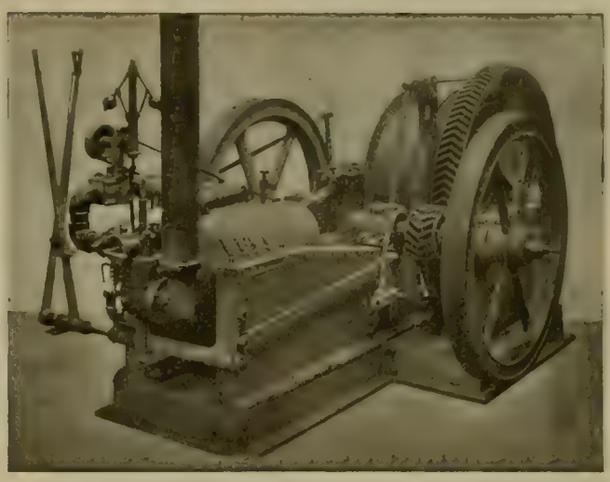
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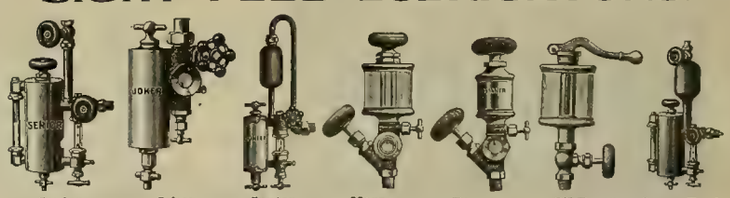
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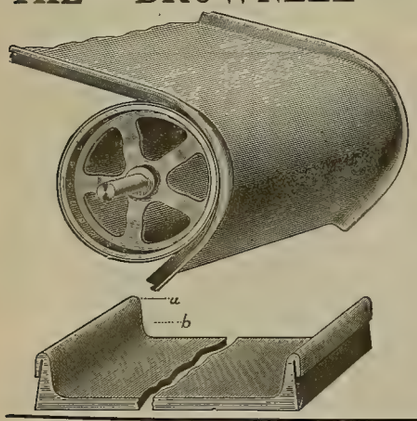
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Per G. M. WILDE, Acting Superintendent.

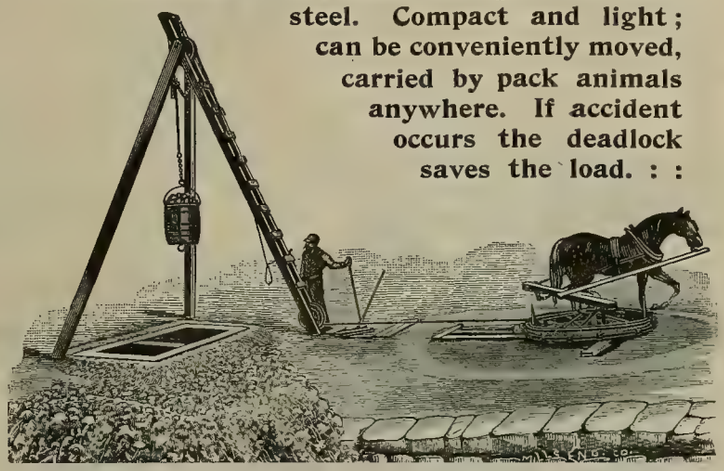
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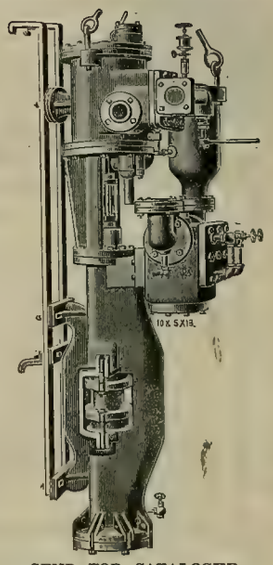
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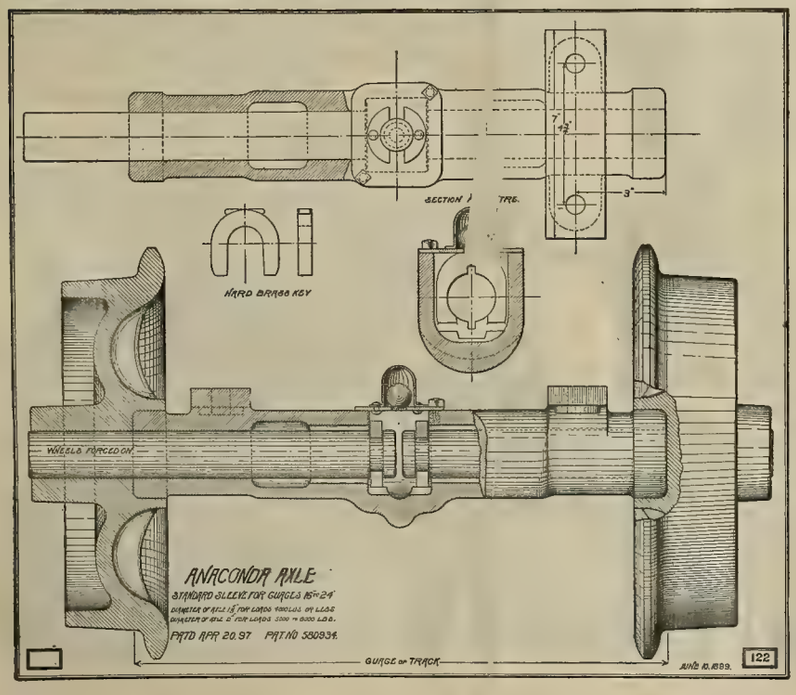


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MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2065. — VOLUME LXXX. Number 5. SAN FRANCISCO, SATURDAY, FEBRUARY 3, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Clays Commercially Considered.

Clays in general commercial use may be divided into two classes: the fictile, a moulding or potter's clay, from which is manufactured porcelain and general pottery, and the refractory clays from which are produced firebrick, etc. Clays originate from the decomposition of feldspathic rocks, such as granites, gneisses and porphyries. These rocks are silicates of alumina, potash, soda, lime, etc. Due to exposure to the action of carbonic acid and water, they shortly lose their potash and soda, or alkaline ingredients, with some of their silica absorbing water meanwhile and being ultimately converted into kaolin, from which the finer grades of porcelain ware are manufactured. Pottery clays, suitable for the manufacture of common clay wares, abound. An almost invariable accompaniment of clay is free silica, or fine quartz, which can hardly be considered as anything but a dilutant of clay. For the potter's purposes, rich or "fat" clays have to be mixed with fine quartz. By rich or fat clays is meant those containing a high per centum of alumina. The lean clay is so called because of its low carriage of that metal. If the clay be too fat, the product manufactured will be liable to crack when subjected to heat. Here the skill of the potter is called into play. He must have a perfect clay to attain a perfect result, such as a rich plastic clay, which will admit of the admixture of considerable fine quartz. Fat clays shrink most from heat. The color of the glazes seen on potter's ware originate from the use of various coloring oxide metals, such as lead, manganese, copper, uranium, etc. A black clay when burned turns white, its color being due to organic matter. A white clay converted into a brick turns red because of the presence of oxide of iron in the clay. The only difference between the refractory and other clays is the freedom of the former from fluxing materials such as potash, soda, lime and iron. The presence of two or three per cent of these fluxes affects its heat resisting properties.

A Gasoline Mine Locomotive.

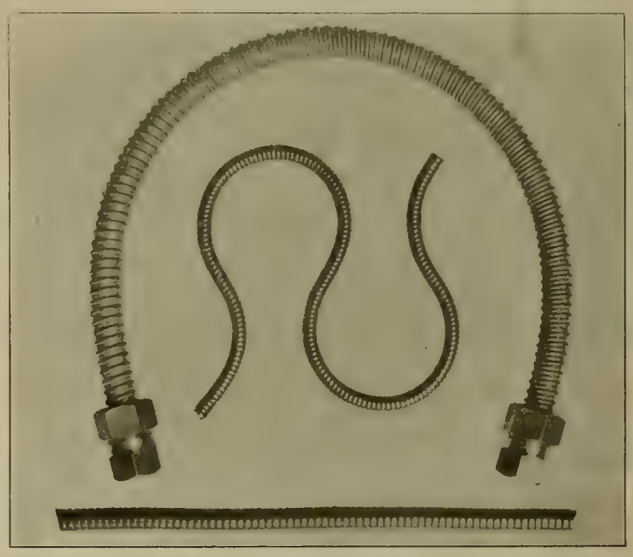
Steam locomotives, electric locomotives, compressed air locomotives, for mine work, have all been illustrated and described on this page, and, not to be behind, gasoline comes forward with its claim for public attention. The accompanying illustration is of a gasoline mine locomotive, built by the Prouty Motor Co. of Chicago. It is of compact design and will haul up to thirty tons; it is 7 feet long over the frame, 54 inches high from top of rail to top of motor and is made any gauge from 30 inches and over; it is equipped with a 25 H. P. engine and has a total weight of about 10,000 pounds; it is geared to reach a speed of about six miles an hour. The makers say that the danger of explosion of the gasoline tank is entirely eliminated by making it very strong, and that the tanks are tested to a pressure of 3000 pounds to the square inch. They claim to have overcome all possible objections to the use of the locomotive and to have so constructed the machine that it is practically "fool proof."



A Gasoline Mine Locomotive.

Flexible Metallic Tubing.

The accompanying illustration shows a new form of flexible metallic tubing, which should be a boon to all who have experienced the annoyances and losses in using ordinary hose. This metallic tubing is guaranteed by the manufacturers to stand steam pressure up to 300 pounds to the square inch. This new style of tubing is made from hardened bronze and steel tapes. The bronze is used particularly for high steam pressures, while the steel is used for water, compressed air, oils, gas, etc. There is no element of experiment about this tubing, there being over 2,000,000 feet of it in actual use. It is unaffected by climatic changes, is cheap and durable, and practically indestructible. Couplings are easily applied to it, being screwed right on the outside of the hose, thus giving the full area of the internal diameter of the tubing for the passage of fluids. For fire hydrant connections, suction hose for pumping, air drill hose in quarries and mines, testing special machinery, and numerous other purposes, it is considered valuable. This tubing, both in steel and bronze, is carried in stock by the Compressed Air Machinery Co., 11–13 First street, San Francisco, Cal.



Flexible Metallic Tubing.

Manufacture of Nickel Steel.

Nickel steel is cast in ingots weighing from 50 to 100 tons, requiring the charge of two or three furnaces to fill the ingot mould. The stock from which the steel is made is metal of known purity—wash metal, pig iron, pigs of ferromanganese, scrap from previous heats, crop ends from forgings, lathe and planer chips from machine shops, and finally nickel, the latter added after the charge is melted and just before casting, as the oxide or metallic nickel unites with silicates in the slag, involving loss. The smaller losses occur with metallic nickel shot, used for alloys containing over 5% nickel. The usual method is to use oxide of nickel mixed with charcoal and lime, made plastic with water, moulded into cubical bricks and dried thoroughly. When added to the bath of steel, at a white heat, the carbon of the mixture reduces nickel oxide to metallic nickel, lime taking up any silica that may be in the adjacent charge, thus insuring immediate alloy and preventing loss of nickel by formation of silicate of lime. The furnaces are of the open hearth type, consisting of an oblong, horizontal metal pan lined with refractory brick and clay, vertical sides provided with doors front and back, ports at the ends through which combustible gases enter and exit after burning. An arched roof completes the structure, the capacity of which varies from 20 to 50 tons. The method of manufacture does not differ much from that practised with other steels.

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ARIZONA should be given statehood at this session of Congress. It has the population, resources and requirements that go to make a commonwealth, and is justly entitled to be the forty-sixth star on the flag.

THE corner in copper and the recent drop is said to have caused a loss of nearly $90,000,000 in Boston alone. While the disaster is doubtless exaggerated, it is manifest that New England investors and speculators are badly hurt, and, probably, many of them decry "mining," not noting the difference between working the mine and working the street. The episode is so usual as to attract little notice.

THE California State Miners' Association, through its Executive Committee, has decided to make active attempt to get the Mineral Lands bill through Congress at this session. It is a measure of present necessity, and one that deserves immediate affirmative action by the national Legislature that the mineral area of California may be preserved from further corporate absorption. A brief document presenting cogent and unanswerable reasons for its passage is being prepared and will be furnished each member of Congress, some of whom, being new members, may not know the facts connected with this long-continued effort for justice to the miner and prospector in California.

AN investor—especially a British investor—usually wants a "going" mine, a property that is developed and profitably producing. In that case he can not expect to get it for the price of a prospect, though that is often just what he does expect. The owner of such a property generally knows what it is worth a little better than any one else, and doesn't care to sell for its actual value. The actual worth of a mine—"going" or otherwise—is difficult to determine. Every influence tends to put the price too high. Experience in this case is a good guide, and, though like the stern lights of a vessel, it illumines only the water over which it has passed, yet if a man will not consider "experience" to be only another name for a history of mistakes, but a valuable record of what successful men have done, he will note that Lane, Hayward, Haggin, Daly, Moffitt, Hearst, Jones, Fair and a score of other millionaire miners made their money largely by buying prospects or partly developed mines, spent money on them, rejected the blanks, pushed the prizes and realized handsomely on the total investment. Mines that are susceptible of being thus made are not extraordinarily plentiful; every prospect will not make a mine, but a prospect wisely selected and properly handled is likely to be satisfactory. What these men have done is a good track to follow in.

Buying Mining Machinery.

In these advanced days it is the fault of no one but the miner himself if he has worked off on him machinery of any kind that he does not want, or that is not suitable. The elements of hurry, ignorance and credulity are pretty well eliminated from the problem of purchasing mining machinery, and there are plenty of reputable concerns manufacturing mining machinery that would not knowingly let any piece of apparatus out of their establishments unless it was just what they represented, and, so far as they could determine from specifications, was what was needed or desired for the work in hand. So that a miner can protect himself from the ignorance, or worse, of the manufacturer who doesn't understand his business, who wants to sell regardless of reputation, and who has no prestige to gain or maintain, by dealing with none but reputable concerns and by looking closely when proffered what may appear to be more than his money's worth. The miner must remember that he takes the most of the risk; that it is more economical in the long run, or the short run, to pay a little more and get good machinery than to buy rattletraps, poorly made and poorly adapted to his needs. Cheapness does not consist in what one pays, but in what he gets for what he pays. It sometimes happens that a miner or an investor will say, "I sunk so much money in mining," and believe it, when he should say, in truth, "I sunk so much money in poor machinery." Time was when a miner had to take what he could get and be thankful. But scientific mining has made great changes in this, and in no branch of industrial progress has there been greater advance than in the production of proper devices to aid the miner in his work, and mining machinery manufacturers now make possible and profitable mining work that was formerly out of the question. Mining machinery manufacturers are entitled to great credit for the skill and capital that turn out such quantities of improved devices, and it is as much a necessity to the modern miner to utilize modern machinery as any modern process of metallurgy. Many a mining plant is to-day clanking along at a loss, when, with the old machinery thrown in the scrap heap, and new, up-to-date appliances put in, there would be shown a profit.

Right here some reader will say, or think: "That's all very well, but I can't throw away my old machinery and buy better." That depends. If he is working for profit, anything that will tend toward economy is business to do. Economy is merely the judicious expenditure of money. It is economy sometimes to save five cents; another time it is economy to go in debt $10,000. We are not advising any miner to go in debt or buy machinery that he doesn't need, but we do advise him to get good machinery when he gets any, and if it be manifest to him that improved appliances will produce greater profit than the ancient devices he may now be using, then it were good business in mining or anything else to get such improved machinery. If a business—mining or any other industry—is worth doing at all, it is worth doing right.

South African Mining Machinery.

South African miners report that the Boers are working the Rand mines "after a fashion." Naturally they would get out all procurable, as gold furnishes the sinews of war, and, apart from its purchasing power, there would be a double satisfaction to the Boer in knowing that his enemy was furnishing the ammunition that compassed his own defeat. The recent reverses, or, indeed, the continuous defeat of the British, have at last caused a cessation of hopeful feeling among British holders of Rand mine shares, and it is now recalled with trepidation that Kruger prophesied last October that, if the British won, it would be "at a price that would stagger humanity." The British army and empire is pretty well staggered now, and the old Boer's assertion is further interpreted to mean that, in the event of a British march upon Pretoria, the Johannesburg gold mines will be destroyed, so far as it lies within the power of human ingenuity to wreak ruin among mine workings, and nearly $90,000,000 in machinery wrecked.

American miners who have had much to do with the Rand mines figure that, were that threat carried out, it would take three years to put the mines around Johannesburg in the condition they were just prior to the war. In this regard it is of interest to note that a considerable portion of the $90,000,000 machinery in and around the Johannesburg gold mines is of American manufacture, and it is of further interest to note that well-informed men say that the English plans of the South African gold mines and copies of all the machinery plans have been sent to American manufacturers of mining machinery, and that preliminary arrangements are being made to immediately duplicate a large part of the destroyed machinery, should it become manifest that the vengeance of the Boer against the Uitlander would make such duplication necessary.

An Indication of Growth.

The attention devoted to any industry by the press of the country is a good criterion of its importance. The mining industry of the United States, and particularly that part of the nation west of the hundredth meridian, is well represented. Noticeable is the increase in the number of journals devoted exclusively to mining. Time was, a few years ago, when this paper was the only one in all that vast region devoted to mining and metallurgy, and scientific advance therein. Now there are a score of mining publications. In general they are ably and honestly conducted, and in connection with mining journalism that is saying a good deal. Besides the journals specially devoted to the business of mining the daily and weekly newspapers are a great aid to legitimate mining. They spread broadcast the latest obtainable news, and if it is not always exact or authentic it is corrected or confirmed at the earliest opportunity, and many of the articles appearing in the city and country press would not be out of place in a strictly technical journal. There is, probably, no department of journalism in which there is more harmony and less detraction and effort at injurious rivalry. Every one engaged in the business of publishing a mining paper realizes that his publication must earn a good reputation and must continue to deserve public belief in its rectitude of intent. The mining public will forgive an honest mistake or a manifest inaccuracy, but will not condone any attempt at deception. The common phrase "an honest miner," is a deserved one; miners are honest, and quickly resent dishonesty in a paper or elsewhere. In connection with current publications may be mentioned weekly and monthly issues which deal largely with industries that have direct connection with mining: under this head would come the electrical journals, papers devoted to power, machinery, etc., which exceed in number even those devoted exclusively to mining. During the forty years of its uninterrupted and successful existence the MINING AND SCIENTIFIC PRESS has seen a large number of journals begin life devoted to the same general subject to which it was consecrated so long ago, and views with pleasure the pioneer path now so broadened and numerously traveled. The mining industry owes much to the mining journals of the country; they can be a help or a hindrance, and it is a duty they owe the mining public that the standard of success shall continue to be genuine and that none in the smallest degree betray whatever trust may be reposed in them.

Earth Backing in Masonry Dams.

The subject of earth backing for masonry dams is one of constant dispute by advocates and opponents, the latter claiming that the pressure is increased by the presence of earth because of saturation causing the earth to lose its consistency, and, being heavier than water, to press with additional force against the wall. The advocates argue that even granting that the earth becomes water soaked, that would not augment the pressure, as the two factors of which the pressure or thrust against the back of a retaining wall is made up are the weight of the retained material and the angle of repose which it naturally assumes. The majority seem inclined to favor the latter argument. Should the former prove to be sound engineering practise it must become a matter of immediate concern to such California and Colorado engineers as recommend the construction of purely earthen dams without masonry core walls.

Concentrates.

A TON of calcium carbide, made in England, costs $42.90.

IT is asserted that steel containing 12% of manganese can not be magnetized.

IN the last nine years Cripple Creek, Colo., has produced in gold $68,475,873.

MASSACHUSETTS laws require that capital stock subscribed shall all be paid in.

CRUDE petroleum added to the feed water is said to prevent boiler incrustation.

IN January, '96, platinum sold at $14 per oz. in New York City and 50s per oz. in London.

THE International Congress of Mining and Metallurgy will be held in Paris beginning June 18th, 1900.

A VALID mining location, lode or placer, at once withdraws from the public domain the land it covers.

THERE are in nearly all large cities manufacturers of artificial limbs. There are three in San Francisco.

AN injector forces water into a boiler because the area of the steam nozzle is greater than the area of the combining tube.

THE avoirdupois weight of a box of pure gold 5x8x4 inches would be 111.44 pounds; of gold dust, about two-thirds that amount.

PROBABLY the best commutator lubricant is heavy petroleum oil applied very sparingly with a cloth slightly moistened with the oil.

POTASSIUM CYANIDE begins instantly to decompose when exposed to the atmosphere, as is evinced by the smell of hydrocyanic acid.

THE description and illustrations of patents weekly published in this paper are official, being obtained direct from the U. S. Patent Office.

TIN ORE is found in various parts of Bolivia, S. A., and, concentrated, is exported therefrom to the probable amount of 300 tons per month.

THE concern furnishing the electrolytically formed seamless copper steam pipes is the Elmore Patent Copper Depositing Co., Ltd., Leeds, England.

TO MAKE a solution for a bichromate of potash battery, to a saturated solution of bichromate of potash, add slowly one-fifth its bulk of sulphuric acid.

DRY AMALGAMATION is by no means impracticable or impossible, but has not proved a commercial success, largely because cyaniding is a cheaper process.

IF a gauge be put under the bottom of a steam boiler, and the boiler be put in use, the gauge will show the pressure of the water plus the pressure of the steam.

POSEPNY'S "Treatise on the Genesis of Ore Deposits" will be found in the transactions of the Chicago meeting in 1893 of the American Institute of Mining Engineers.

COPPER sulphide tends to travel to the interior of lumps of ore in kernel roasting. Silver, on the contrary, concentrates to a perceptible degree on the outside of such lumps.

A 100 H. P. ENGINE should ordinarily develop about 70% of the indicated H. P. in electrical H. P. (746 watts each). A water tube grate bar is not considered successful or economical.

THE number of turns of wire in an electro-magnet may be learned in this way: Multiply the thickness of the coils by the length and divide the product by the squared diameter of the wire.

THE effect of a good covering for lines of steam pipe is to increase the efficiency, value and safety of the power, condensation being reduced, and breakage due to saturated steam being less liable.

CHEMICALLY pure potassium cyanide cost $1.50 per pound in 1877, half that in '78; in '79, 70 cents; from '90 to '95, 50 cents, and 98% can now be bought in carload lots for 28 cents per pound f. o. b.

A PERFECT vacuum is a perfect insulator. It is possible to exhaust a tube so perfectly that no electric machine can send a spark through the vacuous space, even when the space is only one centimeter.

AN American miner in the Klondike, British Columbia or elsewhere in British territory "can become a voter" there after a residence of three years by taking the oath of allegiance and becoming a British subject.

THIS paper never attempts the correction of mistakes however manifest, noticed in its contemporaries, being too busily engaged in trying to reduce to a minimum the possibility of similar errors in its own columns.

BY selection of men and care on their part, it is possible to work where the pressure of air is 50 pounds per square inch, but, with average conditions, the limit is 42 pounds, and the shift not more than four hours.

WOLFRAMITE, or tungstate of iron, is found associated with gold quartz in the Arivica district, Pima Co., Ariz. At Murray, Idaho, is a vein of tungstate of lime, or the species scheelite, alongside a vein of gold-bearing quartz.

A WHEEL as a whole does not go around the axle, although all of its parts revolve around the axle when it is running. The hub turns with the rim, and, although there is no change of relative position of parts of rim and hub, yet it may be truly said the rim goes around the hub, for every part of the rim is consecutively on every side of the hub.

STATE MINERALOGIST COOPER sends a bulletin (No. 16) just issued, on the genesis of petroleum and asphaltum in California, and says four other bulletins on oil, gas, petroleum and asphalt are expected to be shortly issued by the Bureau.

THE difference between limes and cements is that limes will set only in contact with dry air; for the setting of cement not only is the presence of dry air not necessary, but the best results obtain when the cement is kept wet or immersed in water.

PHOTOGRAPH PROOFS can be kept from fading by being dipped in a solution of two grains hyposulphite of soda (such as is found around a chlorination works) dissolved in five ounces water for ten minutes; then wash in changing water for 1½ hours.

A CHICAGO firm who sent a calendar handsome enough to justify a notice, writes that had they known this paper was going to give it a notice they would have printed more of them; for since the appearance of the notice the demand has exceeded the supply.

THE point of maximum density of fresh water is 39.2° F. The hottest sun's rays are not perceptible in water below a depth of 64 feet. Prof. Le Conte, in August, found the temperature of Lake Tahoe to be 39.2° at 1506 feet depth, 41° at 772 feet and 67° at the surface.

TO FIND the volume or contents of a barrel or cask of any form: add together 39 times the square of the bung diameter, 25 times the square of the head diameter, and 26 times the product of the diameters. Multiply the same by the length, and divide the product by 36,470 for U. S. gallons.

THE atomatic group in chemistry is a class of hydrocarbons, chiefly characterized by containing a group of six carbon atoms, in which, out of the twenty-four units of atomicity, eighteen are supposed to be saturated by union of carbon with carbon, leaving only six open to external saturation.

THE brass mine in South Dakota, the cheese mine in Australia, the deposit of terra cotta in North Carolina and the white gold worth $22.50 per oz. in Picacho, Cal., must yield in absurdity to the renewed story of the search for the lost "Pegleg" mine, between San Jacinto and Temecula, Cal.

TO FIND the horse power of a steam engine multiply the area of the piston in inches by the pressure of steam per square inch, then multiply the product by the speed of the piston in feet per minute, and divide by 33,000. This gives the theoretical horse power, but it leaves friction out of the account.

THE only known method of producing auric chloride perfectly free from acid salt is to decompose aurous chloride with water. When gold is heated in chlorine at atmospheric pressure, trichloride of gold is formed and volatilized at all temperatures above 180° C., up to and, probably, beyond 1100° C.

CHLORIDE OF ZINC is superior to copper as a disinfectant, but is more expensive, and, therefore, not so available, when large quantities are required. Corrosive sublimate—one part to a thousand parts of water—is an effective disinfectant, but a virulent poison, and to be handled with extraordinary care.

IF a circular piece of metal, 2½-inch diameter and of certain thickness, weighs ten pounds, a circular piece of the same metal, 5 inches in diameter and of the same thickness, will weigh forty pounds. Weights are proportionate as to areas. The area of the piece 5 inches in diameter is four times that of the one 2½ inches in diameter.

THE first mention of cyanide of potassium as a solvent of gold, so far as "Concentrates" knows, was in the American Journal of Science, Vol. XLI, for March, 1866, in which in the course of an article by Dr. Henry Wurtz, the author mentions that cyanide will dissolve gold from its ores. He also refers to dilute solution as being of advantage.

A METHOD of welding lead is as follows: The surfaces to be joined are carefully cleaned, and between them is placed thin layers of lead amalgam. On passing an ordinary soldering iron along the line of junction, the mercury of the amalgam is vaporized, and the lead, set free in an exceedingly divided state, fuses and unites the two surfaces together.

ELECTROID GAS is made from pure acetylene gas by dilution, is composed of acetylene with the admixture of inert matter and a proportion of oxygen, is perfectly white, said to be equal to 250-candle power, as against the average 17 C. P. of ordinary coal or water gas, and, so far as known, is used as an illuminant only in Hunmanby, Yorkshire, England.

WATER issuing from a nozzle with a pressure of 125 pounds to the square inch would be at a velocity of 8100 feet per minute: a nozzle $\frac{1}{16}$ inch in diameter at that pressure would discharge 10 cubic feet per hour. A jet or impact wheel of the Pelton type should be 6 inches diameter to run at 2800 revolutions per minute on a jet of that pressure and speed.

MOLYBDENUM is a soft metal, easily filed and polished, malleable when hot, does not scratch glass; specific gravity 9.01. Oxidized it is converted into molybdic acid, extremely volatile, and hence of value as a deoxidizing agent in manufacture of steel in place of manganese or aluminum, leaving no effect on the malleability or tempering properties of the steel.

WITH dry surfaces the hardest metals with smooth or polished surfaces have the least sliding friction when two surfaces of the same kind of metal are rubbed together. Hardened steel surfaces have the least friction of the metals most convenient for general use. Antimony on hard steel has a low per cent of friction, as has also nickel upon nickel, or nickel upon hard steel.

THE fastest steam craft afloat is the Turbinia, built at Newcastle, England, by C. A. Parsons. The boat is 100 feet over all, 9 feet beam, 44½ tons displacement, has three compound steam turbines, each driving a shaft with three propellers—nine propellers altogether, and having a speed of 34½ knots (37⅝ miles) per hour. The consumption of steam is figured at 14½ pounds per I. H. P. of the main engines.

A BANDSAW with pulleys 28 inches in diameter would obviously require different horse power according to speed and style of work. With a speed of 480 revolutions per minute, or 3520 lineal feet per minute, belt pulley 12 inches diameter, 3½ inches face, hand feed, motor belted to saw shaft, in ripping seasoned oak 3 inches thick, feed 2½ feet per minute, it would take 2.3 H. P.

WHERE a cannon ball is fired from a cannon in a horizontal position, and another cannon ball is dropped from the mouth of the same cannon at the moment of firing, the dropping ball will reach the earth first. Gravity is a constant force, unaffected by velocity horizontally, but the ball fired from the cannon points in a tangent to the earth's surface. The difference of time is, however, inappreciable.

THE genuineness of any precious stone may easily be proved, and a fraudulent gem exposed by immersion in a specially prepared liquid. Take, for instance, for the diamond, a double nitrate of silver and thallium mixed with warm water to the proper specific gravity, in which a genuine diamond's specific gravity will be instantly manifest when immersed. For lighter stones methylene iodide is used in a similar manner.

QUICKLIME contains 44 parts by weight of carbon dioxide, and 56 parts oxide of calcium. In slaking, 18 parts by weight of water unite with the 56 parts quicklime, making 74 parts calcic hydrate. Hydraulic lime contains 10% to 25% alumina. It differs from quicklime in that it hardens in water. A safe and durable hydraulic cement can be made from the slag from blast furnaces. It is of the same specific gravity as Portland cement—3.10.

CALIFORNIA oil is not readily susceptible to purification for lighting purposes because of its non-possession of a paraffine base. Petroleum distillates are purified by washing with sulphuric acid. The purer the acid and the lower the working temperature, the better the results. The action of sulphuric acid on petroleum is twofold: 1. Elimination and solution of impurities. 2. Oxidation of the heavier portions.

THE Pœtsch system of sinking through sand is the transformation of the ground into a block of ice. At Onnanig, France, the ground had to be frozen for a depth of 300 feet, but a shaft 16 feet in diameter was successfully sunk. Holes are bored and tubes inserted through which is sent a solution of calcium chloride at 20° C. below zero. The system is very expensive, the operation of the plant alone costing $40 per day.

THE Supreme Court of Colorado—Belmont M. & M. Co. vs. Costigan, 42 P. R., 647—has held that where, in consideration of extension of time to pay purchase money of mining property, the buyer gives notes secured by deed of trust on the property, and agrees with the seller that he will, till payment of the debt, work the mine in mine fashion, the measure of damages for breach of such contract, for which the seller only has a cause of action, is the injury to the security.

ARGUMENTS that tellurium is not an elementary substance are principally four: (1) Tellurium precipitated and dried in a current of inert gas gives higher values for the atomic weight than when sublimed in hydrogen. (2) The properties and composition of the dibromide. (3) The varying results obtained on attempting the synthesis of the dioxide, the basic sulphate, and certain metallic tellurides. (4) The behavior of tellurous and telluric acid solutions toward hydrogen sulphide.

THIS paper solicits contributions of a practical or technical nature, its columns being considered as a medium of interchange of information of common benefit and value. "Everybody is wiser than anybody," and to many men will occur something in mining, engineering, metallurgical or mechanical work, an account of which would be of interest and value to their fellow workers in the mining world. Such details are desired, and when accompanied by sketches or photos for engraving are of additional value.

WHEN mercury "flours" it divides into minute globules; upon such subdivision the globules become so coated as to prevent their reunion: this is "sickening." Flouring is favorable to amalgamation if the small particles of mercury alloy with the gold before being covered with foreign substance, and so "sickened." Grease, talcose, clay, varnish, or new screens will "sicken" floured mercury. Condenser water often acts as a sickener of mercury, though some mill men use quicklime as a solvent and neutralizer. How to restore the mercury to its pristine usefulness has been repeatedly published herein.

Dredging for Gold.

NUMBER II.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by THEO. F. VAN WAGENEN, E. M.

The drive weight can advantageously be of the nature of a heavy collar to the drill stem—with ears to hang it up on hooks from the rig when desired—capable of being rapidly attached to and released from the stem. The latter is provided at frequent intervals with bevel shoulders. The drive weight is in two parts and dressed inside with bevelled projections to engage the shoulders on the stem, and the two parts connected with bolts. When not driving, the collar is attached to the stem high enough up to avoid striking, or else it is hung up. When driving, it is dropped on the stem sufficiently to effect the blow. Except when passing through tailings or muck (in which drilling is unnecessary) the drill should never be much in advance of the shoe, or material will come in from the outside and the sample be vitiated. The drillings as hoisted by the pump are emptied into a wooden box about 4 feet square and 1 foot deep, and from there as convenient shovelled into a small portable rocker and washed.

When bedrock is reached, it should be penetrated until real solid material is obtained (which means from 3 to 18 inches according to the rock). By so doing it is possible to clean the hole absolutely of gold, as the water will be shut out, and valuable information is obtained as to how far into the bedrock the digging mechanism of the dredger can be fairly expected to cut. Of course a careful log must be kept of each hole, giving the depth at which the various formations—tailings, loam, gravel, bedrock, etc.—are cut, with proper memoranda of anything else encountered, such as logs, drains, drifts, etc.

Mercury is used in the rocker. The globule is emptied into a pan, and after being washed is transferred into a bottle, which is given the number of the hole. I have found it convenient to use a bottle about 2½ inches long and ¾ inch diameter, with wide neck. Later, the quick is squeezed, the resulting pellet of amalgam retorted in a porcelain capsule over an alcohol lamp, the retort fused with silver on charcoal before the blowpipe, parted in the porcelain capsule and brightened, and finally collected again into a button with the blowpipe and weighed. Of course, if an assay office is available it is better to send the retort there. But in ground averaging 20 cents per cubic yard or better, and using a pipe 6 inches or more in diameter, and with holes 20 feet or more in depth, the button of gold will be large enough to be manipulated without difficulty as indicated. Once obtained, each button can be conveniently put into a little homeopathic bottle properly labelled with the number of the hole, weight of the button and calculated yield per cubic yard. A wisp of cotton stuffed into the bottle before corking keeps the pellet in one place on the bottom and gives a white background against which it shows up well.

When a block of ground is to be sampled, a surveyor should run lines across it about 100 feet apart, and place pegs every 100 feet on each line. Excluding the outside pegs, which will be on the rim, the others will represent holes to be sunk, and there will be about four to an acre or eighty to a twenty-acre claim. The holes should not be in lines up and down the creek, but should be rigidly so across it. And when the logs of all are compiled and maps, sections and profiles made therefrom, as much will be known of the value of the property, and as much can be decided of the methods to be used to realize those values, as in the case of a lode whose ore body is entirely blocked out by shafts, levels and winzes, and whose stopes have been thoroughly sampled.

The cost of the operation will be as follows, under the assumptions that the horse and drill are purchased and regarded as an investment and that the holes will average 25 feet deep: Two stout men at $3 each and a boy at $1 will operate the machine. The horse feed will cost 50 cents. The rocker man, who will be a working superintendent, will earn $4. Blacksmithing, repairs and contingencies, $3.50. Total, $15 per day. Such a crew, well managed, will sink two holes of 25 feet depth each in three days, including withdrawals of pipe and movings. That is, 50 feet of holes for $45, or 90 cents per foot. At four holes per acre the cost is $90 per acre, or $1800 per claim of twenty acres. The drill, horse and harness can be bought most anywhere in the west at $750, and will sink 1000 25-foot holes before showing much wear and tear. The cost of the prospecting by this method is very cheap. Any concern that attempts to get along without it simply invites ruin, and deserves no sympathy when it comes.

THE DREDGER.—There are three methods of digging, viz.: by suction, with a single scoop or bucket, and with the elevator or endless chain of buckets. Each has its proper field.

The suction type is best where there is plenty of water and a very small proportion of boulders over 3 to 4 inches in diameter. It is an admirable type for use on rivers like the Snake where there are practically no boulders, but would not do for the Rogue or Klamath, where there are plenty. It will clean up well on micaceous granite bedrock, but should never be employed on slate, serpentine, porphyry or feldspathic granite bedrock. Speaking generally, it is not the best type for mountain streams or channels with grades of 15 feet or over per mile, but is well adapted for lake deposits and reaches of quiet water with grades of 10 feet per mile or less.

The single scoop type has never yet to my knowledge been successfully operated as a gold-saving machine, but as one is being put in during this winter by a firm of careful operators at Idaho City, Idaho, more will be known on the subject in another twelve months. It has been believed that no dipper or clamshell bucket could be devised that would close tight enough under or around its load to stop leakage, in which event gold is certain to be lost. It is also believed that this type of digger stirs up the water and the gravel much more than either of the others, and comparative quiet in the operation is thought to be an essential, for otherwise many of the fine particles of gold will be tossed about and lost in the eddies. The clam shell certainly cannot clean bedrock, and it has been urged that the dipper will not prove a much better tool for that work. On the other hand, with this type a very large bite can be taken out of the gravel at each trip, the load can be elevated to the necessary height for sluicing at one operation, and the washing can, if desired, be conducted on an independent scow. All these are very important considerations and may overbalance the alleged deficiencies in many cases. It is conceded that the single dipper will dislodge and lift rocks and snags that will stall an endless chain. But this may not always be a distinct advantage, for it will sometimes induce the exploration of ground that should be let severely alone, or else be attacked with steam derricks.

The endless chain elevator will, at a pinch, handle rocks (rounded or angular) about 3 feet long, 18 inches wide and 1 foot thick, but should not be given heavier work, and this duty can only be expected of machines of stoutest design. Most elevator dredgers will be stalled with a rock over 18 inches, largest dimension. It will clean soft and even bedrock as well as the suction type and much better than the latter when the bedrock is full of seams or humps, and when the upper few inches of it must be dug away to get the gold that has settled in the cracks. It will not—as at present constructed—elevate the material high enough to wash it, without the use of a second lift.

From the digger the material goes to the grizzly, which screens out as much rock as may be deemed advisable by the designer, who, of course, should know the proportions of rock of various size in the ground in order to design wisely. There is much room for improvement in this department of the gold dredger. The revolving grizzly, especially when supplemented by one or more outside screens for further separation of the smaller pebbles, is a costly apparatus, consumes too much power when it is given a heavy duty, and does very little effective work on other occasions. Yet it is not easy to suggest anything better. It is a most important part of the machine, but, if given the duty of disposing of the bulk of the material, it should be supplemented by a conveyor, and then the power consumed is well employed. If it has to deal with only 5% or 10% of the stuff dug, the huge and expensive iron barrel should be discarded in favor of a simpler device.

For a second elevation of the material, experience has shown that a second elevator will not work. The centrifugal pump is the best machine so far devised. These, when properly lined and when made of the correct size for the work expected of them, answer very well. They are large consumers of power if compelled to effect a lift of over 15 feet. Elevation by water jet propelled by pumps proved, as might have been expected, a lamentable failure, on account of the enormous amount of power required, and all conveying devices so far attempted have produced such a serious elevation of the center of gravity of the boat that its stability is threatened. However, it seems to me that when a second lift of the material cannot be avoided the problem will ultimately be solved by using conveyors and increasing the stability of the boat by broadening its beam. One of the weak points of the centrifugal pump is the large proportion of water it requires, for water is a scarce commodity at many a good gravel deposit. Besides, a large volume of water compels the adoption of a broad and long sluice, lest the gold have no chance to settle in the riffles. These long sluices are expensive, difficult to maintain in equilibrium and difficult to clean up. The system of catching the gold on tables or matting is a good one whenever it can be employed, but it is only at its best as economical when 75% and over of the material can be handled by the grizzly. There are comparatively few situations where this can be done.



Typical Mountain Dredging Proposition.



Bridge Across Mountain Valley Filled With Tailings.

The dimensions of the sluice, the grade upon which it is set, and its length, must, of course, depend upon the amount of gravel to be put through it, the proportion of boulders to sand, and the proportion of black sand. To design one correctly without fairly accurate information of these points is consequently an impossibility. Yet few dredgers have a sluice built after consideration of these matters. Small wonder, therefore, that so few are saving even 50% of the gold which at heavy expense is put into them. But it was not so many years ago that stamp mills and other reduction works were built without consideration of the physical and chemical qualities of the ores to be handled by them, and perhaps before gold dredging shall have attained the stable condition as an industry that ore reduction now has, it must register as large a proportion of failures as the latter has.

The problem of delivering the tailings far enough away from the dredger so that they cannot flow back under it, when there is a limited amount of water, is a very serious one and has only been partially solved by the various devices known as stackers. When there is a fair grade in the channel being worked, say 25 feet per mile or more, the difficulty can be partially overcome by working down stream instead of up, but if the proportion of sand in the entire mass dug exceeds 50% brush dams must be employed, and these involve considerable expense and constant attention. Of course, if the water supply is abundant and the grade of the channel fair the machine should work up stream, and the debris will take care of it-

self or is easily managed. A portable dam consisting of wooden or metal frames holding perforated metal screens has been suggested in this connection and will be experimented with during the coming summer. It is the idea of the inventor that several lines of these thrown across the channel parallel to each other and 10 to 20 feet apart will arrest nearly all of the debris, and that each line will be recoverable and may be reset as the boat advances.

For holding the boat to its work, anchors or guy ropes will, of course, suffice when the gravel is lifted by suction or when shallow or soft material is to be dug. But in all other cases the spud is the only successful apparatus so far devised. The elevated mooring frame has no value, as the boat rocks under it and the steel ropes will not stand the strain unless inordinately heavy, when they become unmanageable. Spuds are now set in pairs, one being used to walk with and the other to hold. The latter is preferably of two sticks each 18″x36″, clamped together so as to make a beam 18″x72″, beveled at the bottom to a chisel edge and steel shod.

After many years experimenting dredging in the Snake river has been made a commercial success, but this has been accomplished by the discovery that the bulk of the values in the bed of that river are in the black sand rather than in the visible gold. For a distance of 250 miles, as it passes through southern Idaho, this river carries payable value and can be worked except where the stream travels in rapids or over falls. The material is brought up by suction pipes, screened of all the pebbles and the balance run over amalgamated copper plates, exactly as in the stamp mill, and considerable free gold caught. The tailings are then passed through ordinary sluice boxes in which the heavy black sand is readily caught. This latter is shipped to the smelters and constitute a very profitable product. There is room for nearly 200 of these machines on the river.

They are built at light expense, are operated very economically and are proving about as certain and profitable an investment as is to be found. In operating them the same ground is worked season after season with no diminution of results, for it is now well recognized that the Snake river gold comes from the immense lava bed through which the stream has carved its way, and the metal is being made free by erosion continually. It is certain that this source of gold will be very heavily drawn upon as soon as these facts become generally known. It is probable that certain stretches of the Colorado river and of the upper Missouri present similar opportunities and nearly identical conditions.

The channels of the Klamath and Rogue rivers are at numerous points extremely rich in gold, but present wholly different conditions and must be attacked by other methods. I have not heard of any successful dredging enterprises in these regions as yet, though there have been several attempts, not preceded, however, by any careful study of the conditions under which operations must be carried on. Certain Colorado streams are also rich in gold, but their channels are also (almost without exception) so extensively sown with large boulders that success is well nigh hopeless. The same is largely the case in Montana—in fact, in all regions where the altitude is high the bulk of the streams will be found to possess a fall of 30 to 40 feet per mile. This, except in favored spots, means a rough, hard bedrock, very difficult to scrape and clean and generally plentifully covered with boulders and fragments of country rock from the adjoining hills.

There exists, however, in the West such a very large area of good dredging land, where the gravel is rich and the physical conditions favorable, that engineers sent to report on such enterprises should unhesitatingly turn down every one that presents features at all doubtful. A client should not be advised to take chances in a new business when none are necessary; or, at least, he should be candidly informed of the dangers ahead if he insists upon attacking a risky problem. And investors will do well if they decline to embark upon a dredging venture upon the strength only of proven values in the land, or with a machine that has no more recommendation than that it has succeeded somewhere else; for there are many thousand acres of territory in the West that can be shown to carry $1 per yard and upwards and yet cannot be worked by any known device or method at a less cost than $5 per yard, and there are machines that will work well under one set of conditions and break down utterly in all others.

Unusual Electrical Display.

A few nights ago, while a doctor of Oroville was going to Palermo, he passed the electric wire that carries the vast supply of electricity from the Yuba power station to the Feather river dredgers. One of the wires had broken loose, and the doctor says it was a strange and weird sight to see the curves and bends of that wire which resembled the motions of a fiery serpent. Now the wire seemed to whirl in immense circles, making the face of the county so bright that one could see to read a newspaper a mile distant. It would strike a pool of water and the noise sounded like the mighty hiss of a gigantic reptile, while clouds of steam arose from the pool. Then it would hit the great green post to which the wires are fastened, and when it did, a sheet of flame 40 or 50 feet high would shoot up into the air. The motions and contortions of the wire were of such a character that one seemed fascinated and compelled to gaze upon it without the power to turn away.—Oroville, Cal., Register.

Gold Mining and Milling in Georgia.

Written for the MINING AND SCIENTIFIC PRESS by H. V. CROLL.

A brief description of the past methods and a few remarks regarding some of the recent advances in gold mining and milling in Georgia may be of interest to your readers, particular attention being paid to the Dahlonega district of Lumpkin county.

This district seems to have been enthused with new life after a long period of partial idleness. Ever since the beginning of mining in this State, the surface material or decomposed ores, together with the clays and sands, have been mined by hydraulic giants and sluiced to the mill bins, while the stamps were hung up. The water was allowed to drain off into the creek or river, and when the bins had been filled the stamps began dropping. All mills were fed by hand shoveling, and the usual practise was to build the ore bin with a flat bottom on a level with the bottom of the mortar. Very little attention was paid to the order of drop of the stamps, and I saw one mill having the cams so arranged on the shaft that the stamps would drop in 1, 2, 3, 4, 5 order.

These mills are usually of 450-pound weight of stamps, very light in the construction of all parts, particularly of the mortars and shafts, and especially in the construction of the mortar blocks, in which the springboard principle seems to have been followed. None of the mortars that came under my observation had any provision for inside amalgamation, and all had a very limited amount of copper plates in front of the battery, seldom more than 20 feet square per battery, and some with not to exceed 12 square feet, and in nearly all cases the copper plates were in a very bad condition, having green spots as large as your hat.

A few of the mills I visited were equipped with concentrators, but this is the exception. I am told that some years ago some of the earlier types of concentrators were tried, but with very indifferent results. In the last year a few mills have been experimenting with the more modern type of machine. This is due to the fact that most of the mines are producing ores from lower depths, which are becoming refractory.

This district is fortunate in having an abundance of water with excellent water powers, and for this reason it is the rule that almost all the mills are run by water power. By the use of the giant it was only possible to move such of the ore or rock as was decomposed and soft near the surface, taking in all of the soil and clays above it. All of this material was sluiced to the mills by the waste water from the giants, and it is evident that a large percentage of the fine free gold passed entirely through the mill and into the river or creek, caused by the large amount of water used and the amount of clay in the mass. I have observed in places where a capping of red clay 30 feet in thickness has disappeared by passing down the sluices and through the mill, in order to uncover the decomposed ore bodies.

In the mills coarse screens of extra thickness were the rule rather than the exception, and this was done, I am told, to keep the capacity of the stamps up to that of the giants, and it is commonly asserted that better than a 20% saving was seldom made. This is evident by panning the tailings below these mills that have run in past years. When mining with the giant, as soon as a solid or hard formation was encountered, operations at that particular point were suspended and attention turned to another point or place which was of a softer composition. In this way thousands upon thousands of tons of ore, rock and clay and soil have been sluiced to these mills, and the result of this work is shown by great cuts made into and through the hills. One in particular, known as the Barlow



Barlow Cut, Dahlonega District, Georgia.

mine or cut, lacks only a few feet of being a mile long, and is about 300 feet wide and 300 feet deep in the central portion.

The above is an outline of the past usual mining methods of this district, and it can be truthfully said that the science of mining and milling, especially the latter, is to-day no further advanced except in a very few isolated cases than it was fifty years ago.

At a few of the mines of northern Georgia concentrators are used and have the cyanide or chlorination process for the final extraction from the concentrates, but there are no mills thus operated in the Dahlonega district.

The accompanying cuts give views of a large plant now being erected in this very interesting district,



Chlorination Plant, Dahlonega District, Georgia.

which has a mining history dating back at least seventy years—and nearly 300 years, if the operations of the Indians and Spaniards are to be considered.

The Dahlonega Consolidated Gold Mining Co., composed principally of Ohio gentlemen, with J. W. Adams of Chattanooga, Tenn., at the head of the organization as president, has undertaken the mining and milling of the vast bodies of gold-bearing ores which have been left exposed by the operations of the early miners, upon a systematic and by the most improved methods. This company now owns and controls about 5000 acres of land—land is held in fee simple; there are no mining claims as in the Western States—most of which has been in past years cut up in the surface by the giants. As the ore bodies of this district become refractory upon gaining depth, the Georgia type of mill has been unable, with the methods in vogue, to handle ores of this character at any advantage to the operators, for the reasons given in the first part of this article. Therefore the Dahlonega Co., profiting by the experience of others and the observations made by President Adams covering a number of years, determined to build a plant of modern type and also to secure the services of well-informed operators.

This company now has almost completed a 120-



120-Stamp Mill—General View—Dahlohega District, Georgia.

stamp mill, each stamp weighing 850 pounds. The mill is equipped with forty-eight 6-inch vanners of special design to suit the requirements of this prticular ore. The crushing is done by two crushers, one large and one of a smaller size, with a revolving



120-Stamp Mill, Dahlonega District, Georgia.

screen between. By this arrangement the ore will all be reduced to 1 inch and less before going to the stamps. After crushing the ore is elevated and distributed to the stamp bins by two belt conveyors,

and is then fed to the stamps by automatic feeders of the suspended type. The mortars are of the high single issue type and arranged inside for front and back amalgamating plates. In front of each battery there is 54 square feet of copper plate arranged in three sections with mercury traps and hydraulic classifiers at the ends. The hydraulic classifiers size the pulp before distributing to the vanners. The power plant is located midway in the mill, so that the plant consists of virtually two 60-stamp mills under one roof. This was done to avoid long lines of shafting.

The power is derived from two 6-foot Pelton water wheels, having two nozzles each operating under 225-foot head of water, and two Pelton motors operating under a like head of water for driving the vanners. The large wheels are so arranged that various combinations can be secured, should at any time one of the wheels become disabled or it is desired that a portion of the mill be shut down. This power plant has a surplus of power over that required for the stamps, to drive a twelve-drill air compressor and three electric generators; one generator for lighting the mills and mines, another for operating an electric tramway, which by a system of trackage connects the various mines within a radius of about a mile with the mill, and the third supplies power for operating an electric hoist capable of hoisting from 1000 feet deep.

The water for operating these wheels is brought down the hill in a 36-inch diameter wooden pipe 900 feet long.

This stamp mill building covers a space of 300 feet long by 120 feet wide. All timber used is of Georgia pine.

The concentrates from the vanners are loaded into cars and conveyed by the electric railway to the chlorination plant. This plant consists of one Holthoff-Wethey roasting furnace with an automatic cooling floor. After the concentrates pass through the furnace and are desulphurized and cooled, they go to storage bins by means of conveyor and elevator, thence to the chlorination barrels, which are of five tons capacity, revolving on end trunnions. The filtering is done in the barrel under a pressure of 100 pounds per square inch. The balance of this plant consists of the usual sand filters, precipitating tanks, filter presses, etc. Provision was made in erecting the building for increasing the capacity at any time. As now installed it will handle from thirty to fifty tons of concentrates per day. The power for this plant is derived from a 3-foot Pelton wheel operating under 225-foot head of water. This plant is lighted throughout by electric lights, both incandescent and arc.

There is also in course of construction a well equipped laboratory and melting house, where the amalgam from the stamp mill and the precipitates from the chlorination plant will be retorted and melted into bars for shipment. This building will also contain the necessary departments for assayers and chemists and their required equipment, also an office for the general superintendent.

As pointed out above, the result of the use of the giant has been to expose large bodies of ore to daylight, which the company will be able to mine by quarrying for considerable time to come. However, in the meantime, a shaft is being sunk to go 500 feet deep, by which they can tap the ore bodies through drifts and also make connection with several tunnels located between the collar of the shaft and the 150-foot level. By this means the company will develop the underground portion of the mine while quarrying on the surface.

During the busiest times of construction the company employed between 500 and 600 men, colored as well as white. Labor is very cheap and plentiful, but of an inferior grade as compared with other mining districts.

The climate in the mining region, that is, in the hills, is excellent, and very healthful, the elevation being about 1200 feet.

All the machinery and lumber used in the construction of these plants was hauled in wagons over about thirty miles of fairly good wagon road, and there has been about 2,000,000 pounds machinery transported from the railroad to the mill site in this manner, being mostly done by the farmers of the immediate district.

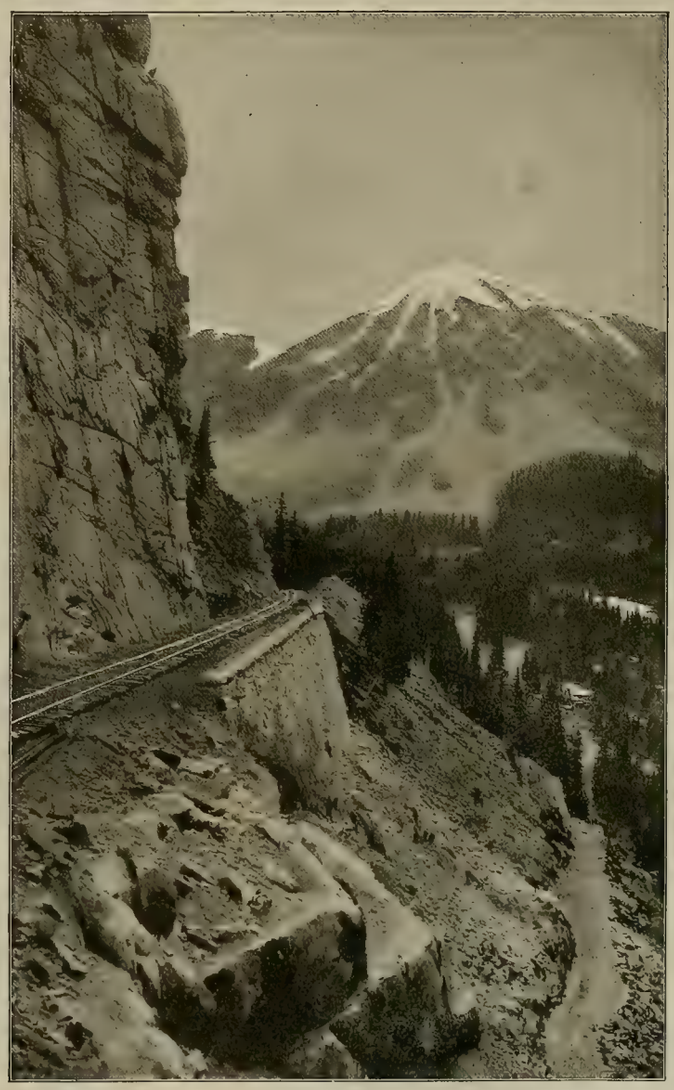
In conclusion I wish to note that the plant of the Dahlonega Co., briefly described above, was designed and erected under the supervision of the Edward P. Allis Co. of Milwaukee, Wis., who also supplied all of the necessary machinery entering into the construction.

It is the belief of the writer from observations made in recent visits to this section of Georgia, that a new era of mining activity is about to begin and that we may expect to see the gold production of Georgia rapidly increase in the next few years. The ore bodies are there and in paying quantities, and it remains only for capital to undertake mining in a scientific way and upon improved methods to make Georgia rank well up in the list of gold-producing States.

TWO-THIRDS of the copper product in America is worked in Connecticut. The great manufacturers of copper are all there, the town of Waterbury alone attending to more than half of the copper worked in the United States.

High Mining in Colorado.

From the high plain—nearly a mile in altitude—on which Denver is built, rise to the west the mountains in which much of Colorado's mineral wealth is developed, threaded everywhere by railroads that have done so much in opening up the mining resources of the commonwealth.



The Palisades, West of Alpine Tunnel, on the Colorado and Southern Railroad.

Twelve miles from Pitkin, Gunnison county, is Alpine Tunnel, the highest railroad pass in the United States, on the line of the Colorado & Southern Ry., on the western slope of the Continental divide. The accompanying engraving portrays the Palisades, west of the tunnel. Of this region it may be said that there lies the largest body of mineralized lime in the State, with contacts containing gold, silver and lead, and adjoining is the granite with its gold fissures. Around the Pitkin basin the quartzite is the lowest sedimentary rock; on top is a blue limestone, or straight calcite, the formation extending through the entire basin. As elsewhere, the ore lies in parallel channels or chutes, having a general approximate or trend of northwest and southwest. In a few places the mineral is galena and lead carbonate carrying silver; in the majority of cases it is a quartz or baryta, with which occur the various sulphides of silver. Associated with these is a small per cent of copper and sometimes a little lead. The baryta is often as large a constituent of the ore as at Aspen, confined closely to the contact, and, when rich, lies in streaks or seams, which rarely exceed 5 feet in width.

The Quartz Creek, Gold Brick, Tin Cup, Taylor River, Tomichi, Box Canyon and Hot Springs gold and silver mining districts are all being systematically developed, timber and water being abundant and the region easy of access.

The Brunswick is a representative property of TinCup district. The company's mines consist of the Jimmy Mack, Mary Maher and other claims. This property has been a large producer. The main workings on the Mack are an incline shaft, depth 300 feet. The company has a fine stamp mill and reduction works on West Willow creek, to which the mine is connected by a bucket tramway 1800 feet in length. A view of the mill is presented herewith.



Brunswick Mill, Tin Cup District, Gunnison County, Colorado

American Competition.

A paper on the above subject, which Manager Dickie of the Union Iron Works, San Francisco, has contributed to the pages of Engineering, is interesting from several points of view. That this well-known British technical weekly should now be printing a series of articles, of which Mr. Dickie's is the fourteenth, on this one topic, is itself a significant fact. How far the Atbara bridge incident and the shipment of an unusual number of American locomotives to England last year may have led to such a result it is difficult to surmise, but that country has certainly come to realize of late as never before the extent of the rivalry existing between her manufacturers and Americans. An eager desire to learn the

secrets of American prosperity is thus excited. And the thoroughness of Engineering's effort to ascertain them is indicated by its seeking information so far away as San Francisco.

The Union Iron Works occupy a unique position, geographically and commercially. Although the chief source of iron ore in this country is the vicinity of Lake Superior, most of the material must be brought down to within less than 500 miles of the Atlantic coast to be smelted and made into steel. At present California is largely dependent on the East for her supplies of material, and the cost of transportation adds to the expense. That the Pacific coast should be able to construct first-class steel ships in spite of this disadvantage is occasion for national pride and congratulation. Mr. Dickie frankly says that the problems of competition with the eastern part of his own country are more important than those of competition with England.

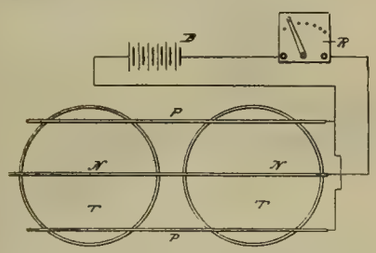
Labor is more costly on the Pacific coast than on the Atlantic seaboard and in England. The manager of the Union Iron Works is not so strongly convinced of the superiority of the American workman as are other experts. Owing in some measure to causes which possibly he may have overlooked, like the wonderful evolution of the bicycle industry and its absorption of first-class machinists, he finds skilled workmen very scarce. To be sure, he says, the American idea is to dispense with labor as far as possible and use machines. But, in his opinion, this practise cannot be indulged in so conveniently in shipbuilding as in other manufactures, "unless some combination of building and owning were made possible that would admit of a number of types of vessels being designed to meet the varied needs of commerce, and then manufacturing them as required. This might help in the production of ships at a less cost than now; but * * * the country that gets its labor cheapest, unless there is some other factor in production that balances the effect of wages."

Latest Mining and Metallurgical Patents.

Patents Issued Jan. 23, 1899.

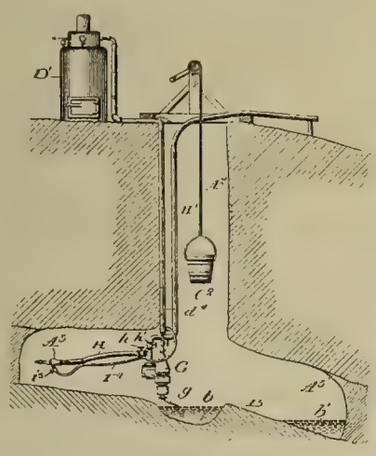
Specially Reported for the MINING AND SCIENTIFIC PRESS.

PROCESS OF PLATING ALUMINUM.—No. 641,709; W. H. Legate, Hartford, Conn.



Electrically depositing metals on aluminum and its alloys by cleaning the surface thereof, then dipping it, first, in a muriatic acid solution having a gravity of 15° B.; second, in a cyanide of potassium solution having a gravity of 20° B.; third in a phosphoric acid solution having a gravity of 50° B.; fourth in a solution containing bichloride of mercury; and, fifth, into an alkaline solution; sixth, passing it through suitable electrically operated striking solutions, and from thence into the electrically operated solutions for depositing thereon the final coating of metal.

APPARATUS FOR MINING IN FROZEN GROUND.—No. 642,047; L. E. Miller, Dawson, Canada.



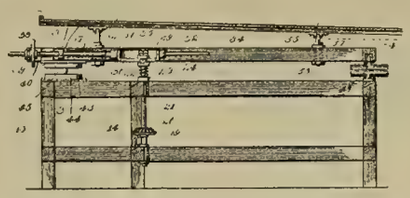
An apparatus for mining in frozen ground, combination with receptacle at bottom of mine for holding a pool of water, of steam ejector located at bottom of mine, steam generator located above surface of ground, means for conveying steam from generator to ejector, for forcing column of water through ejector in contact with steam, means for regulating admission of steam to ejector to control temperature and velocity of water, and means for conveying water back, whereby circulation of water is established within mine and raising of water continuously to surface of ground obviated.

APPARATUS FOR HYDRAULIC DREDGING.—No. 641,716; B. J. Methvin, Tacoma, Wash.



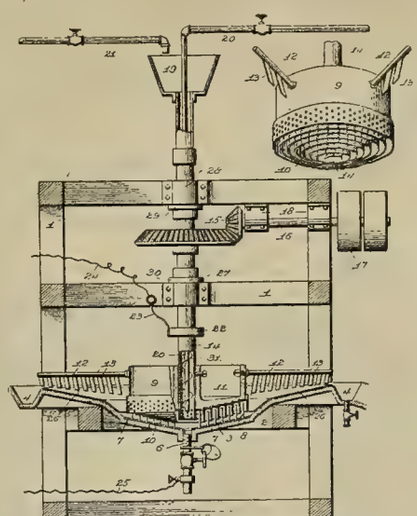
A hydraulic dredger, pipe adapted to be placed in a stream and formed with a rear inclined end adapted to reach bed of stream forward downwardly projecting end, and means for anchoring and supporting same. A tube having an angular end, so that it may be placed over a waterfall, its rear end contacting with the bed of the stream, whereby a suction is created and the material received at one end and discharged at other.

ORE WASHER AND AMALGAMATOR.—No. 641,720; J. Murphy, Butte, Mont.



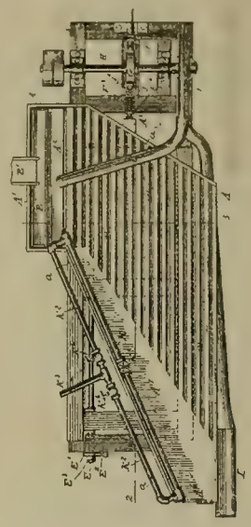
A gold ore washer, combination with main frame, provided with vertical operating shaft, washer on shaft provided with toothed flanges, horizontally movable frame on main frame, sliding frame in movable frame provided with circular opening, an eccentric provided with an upwardly projecting flange at its periphery and with downwardly projecting toothed flanges, means for adjustably securing eccentric to washer, a screw-threaded shaft connected at one end with sliding frame and projecting through movable frame at other end.

AMALGAMATOR.—No. 641,808; H. M. Thompson, St. Louis, Mo.



In an amalgamator, combination with framework; amalgam pan located therein, provided with surrounding overflow gutter having a draw-off, inclined bottom provided with a centrally located depressed portion forming amalgamating chamber having central outlet and an annular series of agitating fingers extending upwardly from amalgamating chamber; a hollow shaft journaled in bearings in framework terminating at its lower end in discharge; convexed agitating head suspended and revolved by hollow shaft within amalgamating chamber; a series of perforated annular concentric flanges depending from under side of head and conforming to convexity thereof and radiating agitating arms radiating from head and provided with depending fingers.

ORE CONCENTRATOR.—No. 641,977; J. Lampert, Hill City, S. D.



An ore concentrator, combination of table having parallel front and rear sides, and obtuse-angled head end, an acute-angled tail end; both ends being provided with upstanding flanges, a feedbox at rear side of table, and parallel longitudinally disposed riffles extending from head toward tail end of table of successively greater length as they approach the discharge edge of table; with ore and water supply pipes leading to feedbox, wash water supply pipe along tail end of table, means for vibrating table, and pipe and pump for returning partially treated ores back to feedbox.

PROCESS OF PRODUCING BASIC LEAD CARBONATE.—No. 641,751; O. J. Steinhart and J. L. F. Vogel, London, England.

Producing basic lead carbonate, forming solution of lead nitrate and solution of sodium carbonate 20% in excess of theoretical equivalent required to act upon solution of lead nitrate to form normal carbonate of of lead, mixing the two solutions boiling and agitating same whereby lead nitrate will be decomposed and precipitate of basic lead carbonate result, together with carbonate of soda and sodium nitrate, thereupon separating precipitate from solution.

The Inducements Appear to Be Sufficient.

What is the use of having that partner who didn't put up his proportion of last year's work enjoy the benefit of any strike that may be made on your own or adjoining claims, when we will advertise him out for only $10 in advance?—Woodland Park, Colo., Times.

IT having been proposed to generate electricity on the Canadian side of the Niagara river, and to sell electric power on the American side, somebody raised the question whether such foreign-made electricity might not be made subject to a duty of 10% ad valorem as an "unenumerated manufactured article," whereupon the Niagara Falls Power Co. has passed a resolution stating that the company is opposed to a duty upon electricity generated in Canada and transmitted to the United States; that the imposition of such a duty is not required for the protection of any American industry; and that it might invite retaliatory legislation by the Canadian Government.

LYDDITE, spoken of so much in the present South African war, is merely melinite, the standard high explosive in both the navy and the army in France. It is doubtful whether there is any European army that has not an equivalent high explosive.

A CENTRAL STATION for the production of acetylene gas is being tested at Tata-Tovaros, Hungary, a city of 12,000 inhabitants. Five miles of pipe covers the city and furnishes gas to 158 street lights and 250 burners in houses.

SO GREAT has been the improvement of storage batteries of late that, according to an English engineer, a car now requires 500 pounds of cells, that two years ago needed 1600 pounds.

On the Concentration of Ores by the Use of Water.

NUMBER II.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by CHAS. TAYLOR.

In my last paper we had reached a stage in the operation where it was necessary to recrush the tailings from the jigs, for finer concentration. Here I would be glad to specify what I consider the proper machinery for that purpose, but, for reasons patent to all, this cannot be done. You will notice, however, that I have used the word "crush" throughout, never the word "grind." The reason therefore is summed up in one word, the bugbear of all concentrator men, slimes. Therefore, install crushing machinery, not grinders.

Now, as jigs require a large amount of water, we may have a surplus to get rid of. If so, one or more pointed boxes between the jigs and crusher will take care of that, number and size of boxes depending on the size of plant. This surplus of water is by no means to be allowed to leave the mill, as there is more or less mineral suspended in it, but is to be added to the pulp as it leaves the crusher, or, if short of water, can be used in the ascending current of the sizers, or hydraulic classifiers, the use of which I strongly advise, as, regardless of how well an ore may concentrate without sizing, it will do still better with it. In case of scarcity of water, the curse of so many concentrating plants, small pointed boxes can be used instead of hydraulic classifiers. They will not, of course, equal the performance of the ascending current, but are much better than no sizing at all.

Now, as to the water supply for the ascending current for sizers. It should, in fact, must, be derived from a source independent of the balance of the mill, as the least variation of pressure gives a different size of product, and either more or less of it, and the success or failure of fine concentration depends upon regularity of feed both of sand and water. A very good plan is to have all the water for mill flow into one tank, from which is taken the supply for classifiers, the overflow from this tank being used for balance of mill.

All manufacturers of mill machinery, I believe, make hydraulic sizers, and, as far as I know, they are all good; cost, about $25 per cone. Any carpenter, furnished with 30 feet of lumber, two short pieces of iron pipe, a globe valve and stop cock, can make one.

Now, as to machinery for the concentration of the sands and slimes, the product of the last and finest crushing. The same reason that excludes discussion as to the merits of crushing machinery is of equal force here; consequently, nothing further will be said regarding this class of machines except to reiterate that they all, or any of them, to do their best work, must be fed with the utmost regularity, both with sand and water.

Now, despite all our precautions and care up to this point to avoid the making of slimes, they are still with us, more or less, according to the character of the ore. Now, because I have laid so much stress upon the importance of avoiding the making of slimes, I do not wish to be understood that the values contained therein cannot be saved. It is on account of the increased cost and difficulty of saving these values that this point has been so insisted upon. Machinery for coarse concentration costs but little, and its capacity for product is large, while the reverse is the rule for slime concentration.

The concentration of slimes is a matter of plenty of clear water with which to dilute them, and plenty of tables (of the right kind) upon which to feed them. The working of slimes is like certain decimals which can be carried to a very fine point, but, no matter how far carried, the point still remains.

In closing, I will give a simple slime test for ores: Crush, not grind, sample to desired fineness, weigh out 5 A. T., put in (preferably) glass bottle, or jar with wide mouth, add sufficient water to make thin pulp, shake vigorously for one minute and let stand for one-half minute. Decant the muddy water, being careful that no sand escapes; allow the water to stand for some hours; carefully pour off the clear water, allowing none of the slimes to go over. Thoroughly dry slimes on sand or water bath, weigh, calculate percentage of slimes in ore; assay; calculate percentage of values contained therein.

Nogales, Ariz., Jan. 12.

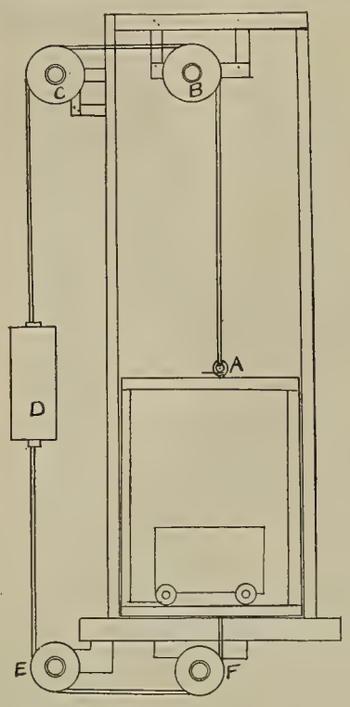
Another Miniature Working Gold Mill.

TO THE EDITOR:—I see by the last issue of the paper that the Union Iron Works have built an exact model of a 5-stamp mill on a one-tenth scale. I have a miniature mill, complete and in perfect working order; the power is furnished by a slide-valve engine with 1¼-inch stroke; the machinery consists of five stamps and plates, crusher, grizzly, concentrator and self-feeder. The total length of mill is 26½ inches; weight, six pounds.

Pearce, Ariz., Jan. 14. FRED BUCK.

Home-Made Balance Elevator.

TO THE EDITOR:—Much time and labor can be saved in mines by putting in a balance elevator, such as is shown in the accompanying figure. Nail up some scantlings in each corner, extending them from the lower floor to the ceiling of the floor above. These will guide the cage. The cage itself is easily made of a 2x2½ stuff, and provided with a ringbolt, A. Put



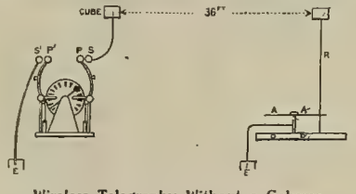
Home-Made Balance Elevator.

grooved wheels, B and C, on pins in brackets secured to the top wall, and run the rope over from A to the weight, D. This weight should balance the cage and about fifty pounds over, and pass over wheels E and F, as shown. A truck is run onto the cage, the holding pin drawn, and only a moderate pull on the rope serves to run the cage to the next level with its freight. The descent is made by hauling on the rope in the opposite direction. R.

Wireless Telegraphy Without a Coherer.

On page 635 of the issue of Dec. 2nd, '99, appeared a detailed, non-technical account of how wireless telegraphy "works," in which mention was made of the coherer. More recent experiments lead to the belief that this hitherto important adjunct may be dispensed with. Electricians experimenting with the Marconi system claim that wireless telegraphy is practicable without a coherer.

In this latest the transmitting apparatus consists of an aerial wire surmounted by a metal cube, electric oscillations being excited in the aerial conductor by sparks from a Wimshurst machine, arranged as shown in the accompanying figure. The knobs, P P^1, of the machine are separated so far that a spark cannot pass between them, but the sparks can pass across two short spark gaps, P^1 S^1, leading to earth, and

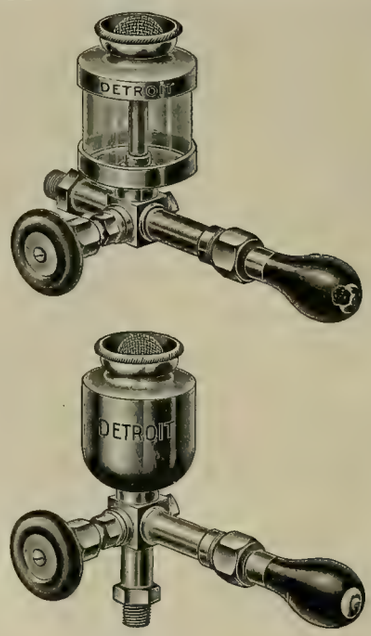


Wireless Telegraphy Without a Coherer.

P S leading to the aerial conductor. The earth-connected knob, S^1, is held in the hand by an insulating handle, so that sparks can be evoked when required by bringing S^1 sufficiently near to P^1. The receiving apparatus consists of a delicately suspended needle, preferably made of silverfoil, and the pivot on which it is suspended is connected to earth. Near one end of the needle is mounted a second aerial conductor, with a cube on top similar to the transmitting conductor. This conductor is mounted on an insulating stand. The end of the needle is adjusted so that it is quite close to the conductor, but is not in contact with it. When sparks pass at the transmitter the end of the needle is strongly attracted by the conductor. This movement of the needle can be utilized to ring an electric bell. A metal stop, forming one terminal of the electric bell circuit, is fixed on the baseboard, so that the needle strikes it as it approaches the conductor, the other terminal of the bell circuit being connected to the pivot of the needle. The movement of the needle is not due to an electrostatic field, as in the experiments of Henry, for no movement is observed till the sparks pass at the transmitter. The considerable distance at which the metallic needle is influenced also points to the action being due to electric waves. The interesting point about the experiment is that the electrostatic attraction on the needle caused by the electric surgings in the aerial conductor should be sufficient to close a circuit. This new electric wave detector is not likely to be so sensitive as the coherer.

Interchangeable Oil Pumps.

The accompanying cuts show the new-style oil pumps that have recently been put upon the market by the Detroit Lubricator Co., Detroit, Mich. An advantage claimed for them over the ordinary styles is that the body can be easily removed from the frame, should it be desirable to do so for the purpose of removing any dirt or sediment deposited by the oil, without removing the oil pump proper from the steam pipe. Each of the bodies of the four styles of



the same sizes are interchangeable. For instance, the body of the brass body oil pump with vertical connecting shank can be interchanged with the glass body of the pump shown with horizontal shank, etc. Each style is also equipped with strainer filler. The manufacturers have issued a pamphlet showing these oil pumps, also their new-style glass and brass oilers, and will send same to any address on application.

Casting Gear With Steel Core.

Sometimes a millwright is required to cast a gear with a steel core. A mandrel is used for casting with good results. The steel core can be turned from tool steel. The coating for the steel core should possess the usual non-connecting and refractory ingredients, with which a surface of 0.01 to 0.02 inches thick may be obtained. The composition is necessarily very volatile and may be bought of dealers in airtight vessels. After dipping, allow the core to drain, and, if the coating is uniform, place the core upright in a dry oven. The drying can be done by heated gases drawn from a charcoal fire. Pattern makers have made use of a cutter in scratching out core boxes. A hardwood hub is used for this purpose, turned to about the same form as the space to be cut out, care being taken to allow each pin a narrow portion of the work to attend to, and enough to take in the whole cut at once. The surface of the hub is used for a guide in grinding the pins and a small cavity made in the hub just in front of each pin for the cuttings to lie in till they are thrown out of the work.

A COSTLY STEEL INGOT was recently cast in the crucible house of the metallurgical department of Sheffield University College, England. A steel was required to contain 22% nickel, 3% paladium, with carbon practically nil. Twelve and one-half pounds of 25% nickel steel scrap were charged into the crucible and clear melted; then 6.32 ounces of paladium sheet (value £60 14s) were added to the charge. As dead mild steels occasionally find their way through the bottom of the crucible before they are ready to pour, the final stages were watched with almost breathless interest. The whole operation was, however, successfully completed, and the ingot rolled and drawn into wire.—American Manufacturer.

MINING SUMMARY.

ALASKA.

Dawson is dwarfed by Cape Nome, the latest mining attraction in the far North. Last year, at the beginning of the announcements, this paper suggested that some of the Nome gold-bearing sand be brought to San Francisco in ballast for assaying, etc. The idea had already been acted upon by several south-bound vessels which began to arrive from there with sand, some just as scooped up off the beach, some selected, and some locally concentrated. All so brought down has been sampled and tested by San Francisco assayers. The sand shoveled off the beach went from 22 cents to $1.30 per ton; the selected sand gave values of $28.50 per ton; the concentrates from $500 to $1000 per ton. The concentrates were necessarily crudely obtained, float gold being in any event difficult to save. Pan washing fails to secure more than an appreciable percentage of the gold, and the lack of fresh water and other necessary appliances interferes with amalgamation. The water used for rocking is generally that of the ocean. In a few cases, however, the sea water has been raised by steam power, and sluices constructed along the beach. In the rocker the gold is caught on blankets, and, to some extent, on copper plates, coated with mercury. In many instances, when the supply of copper plate could not equal the demand, the bottom of the rocker was covered with United States silver coins, principally $1 pieces, and these coated with the mercury, which caught the gold. The tundra between the beach and the base of the mountains has been prospected to some extent and has yielded from 10 cents to 30 cents per pan. Capital, however, will doubtless be required to handle the tundra with profit. The benches in the lower region of the mountains have been found to be gold-bearing and have been largely staked. In the gulches the work is carried on by stripping, sluicing and, to some extent, by rocking, while on the beach the method of extracting the gold has thus far been almost exclusively by rocking.

The copper sulphides offer obstacle to the use of cyanide, and the solution of the problem of extraction of greater value will probably be solved by modern machinery next summer.

From Cape Nome for thirty miles or more westward to Synrock, the shore line is straight and smooth; back of the shore line, between it and the base of the mountains, occurs the tundra, a strip of treeless, moss-covered, marine gravel, forming a costal shelf about 30 feet above sea level, sloping upward until at the base of the mountains, four miles from the beach, it is 200 feet high. During the summer it is usually wet, soft and boggy, dotted by ponds, and traversed by the Snake, Nome and Cripple rivers.

The nearest harbors for deep-sea or ocean vessels are Port Clarence, sixty miles northwest of Nome, and Golovin bay, the same distance northeast. Port Safety, to the east of Cape Nome, will admit vessels drawing 7 feet of water. In front of Nome the sea is shallow; the larger vessels cannot approach the shore, but are obliged to discharge by lighters.

The mountains thus far examined are composed of mica-schists and limestone, alternating in layers and beds with each other. They are thin or medium bedded rocks, strike and trend northeast and southwest, dip southeast at an angle of 45°. The limestone is bluish gray, fine grained, metamorphosed, often becoming crystalline marble. The mica-schist is slaty, shows considerable metamorphic action and is garnetiferous. Locally the rocks are sometimes folded and traversed by quartz veins and veinlets of both quartz and calcite, with also some iron and copper pyrites. Pyrites are also disseminated sporadically in the schists. The quartz veins and veinlets traversing the rocks are supposed to be the source of the gold.

The tundra is composed of apparently marine gravels, derived from the rocks in the mountains, and is almost exclusively mica-schist and limestone. Toward the mountains the gravels are often coarse, carrying boulders of considerable size, but along the beach they have been largely reduced to fine gravel and sand by wave action. It is in this reduced material that the beach gold occurs. Along the beach the gold is very fine, having been reduced by wave action with the gravel and sand. Its occurrence there is, for the most part, under 2 or 3 feet of gravel and sand, on a bottom "bedrock" of argillaceous sand. Thin layers of ruby sand inter-stratified along with the gravel, near the so-called bedrock, are also often found to be rich. Coarse gold is being mined in Anvil, Glacier, Dexter and Osborne creeks and along Penny and Cripple rivers.

About 15,000 men figure on reaching Cape Nome by the first steamers. Each one hopes to be the first. Two-thirds of this number will go from San Francisco and Seattle, and the remainder down the Yukon from Dawson and other Yukon towns. Dawson miners have hopes of reaching there first, and are prepared to leave the steamers below Nulato and make a portage of 200 miles across the Tundra. Nearly thirty steamers, each carrying from 300 to 1000 passengers, are now scheduled to sail from coast ports between May 10th and June 1st. Shipping men say that all steamers sailing so early will be compelled to wait at Dutch Harbor two or three weeks for the ice to move out of Behring sea.

Discovery No. 2, at the head of George Inlet, twelve miles east of Ketchikan, is reported sold to Chicago men for $14,000. Copper properties on Prince of Wales island are being investigated by B. F. Brown of New York.

The mining season at Cape Nome lasts from May to October.

ARIZONA.

GILA COUNTY.

The Old Dominion Copper M. & S. Co., at Globe, has resumed smelting, after a brief suspension for repairs.

GRAHAM COUNTY.

The Arizona Copper Smelting Co.'s smelter has begun smelting ore. At the mine timbering the working shaft goes on for a cage when the steam hoisting works arrive.

Supt. C. H. Merrill, Spenazuma G. M. & M. Co., near Ft. Thomas, has forty-five men working on some claims there.

Thirty men are working on the Markeen Copper Co.'s property on the Frisco, above Clifton. A smelter is contemplated.

PIMA COUNTY.

At the Tres Amigos gold mine, Oro Blanco district, F. M. McMasters, who recently bought the property for $40,000, is working free milling ore. He has a cyanide plant of ten-ton daily capacity. Two drifts, the first 481 feet and the second 240 feet, with an average width of 10 feet, are being run. Fifty miners are working.

YUMA COUNTY.

The Harqua Hala mine and mill are reported closed down, throwing fifty men out of employment.

The Sentinel learns that the Colorado River Gold Dredging Co. has closed a deal with a Colorado dredging corporation whereby a $60,000 dredger will be placed on the placer grounds at the Potholes, to have a capacity of 2500 cubic yards of dirt per day of twenty-four hours. Prospects on the ground are said to have shown the material to assay from the surface to bedrock at an average of 35 cents per yard, and it is claimed that the dirt can be worked for 5 cents per yard.

CALIFORNIA.

AMADOR COUNTY.

In the Central Eureka at Sutter Creek the three-compartment shaft is down 1660 feet. A 200-foot drift has been run south from the shaft at the 1500-foot level, developing good ore.

At the South Eureka Supt. Parks is reported as saying that, as soon as coal can be hauled from Ione, the hoist will be run by steam and the mill by water power.

At the Oneida, at Jackson, Supt. Truscott has the new shaft down 2100 feet. A station was cut in the 2000-foot level to run a crosscut to strike the vein.

The Argonaut mine, within the last two years, has paid twenty-four consecutive dividends of over $400,000, and is credited with present possession of over $100,000 in its treasury.

At the Wildman-Mahoney mine, Sutter Creek, Supt. Ross is drifting and stoping in both shafts. Both mills are running to their full capacity. Work in the Emerson shaft will be resumed soon.

BUTTE COUNTY.

At the Little Hope mine ten stamps are dropping and thirty-five men are employed. A new turbine wheel is being put in to furnish power for the mill and air compressor.

CALAVERAS COUNTY.

At the Vorlander mine at Middle Bar, crosscutting a ledge of ribbon rock has struck 17 feet from the shaft.

The Standard Electric Co. is building its road from the power plant at Big Bar to the new location at White's Bar, above Mokelumne Hill. The new machinery will be installed next summer.

The Standard Electric Co. has begun the survey of its new ditch, to be used in furnishing power to operate its new electric plant. An overflow dam will be constructed in the Mokelumne river about seven miles above the West Point bridge. The ditch will be about twenty-four miles long and will have an elevation of about 50 feet above that of the old ditch.

At Angels Camp the St. Lawrence mine, formerly the Bruner, has been incorporated. A mill is to be built. A. J. Cameron is Supt.

EL DORADO COUNTY.

(Special Correspondence.) — In sinking the shaft at the Little Jem mine they have found ore that will mill $100 per ton. At the Old Van mine they have struck the ledge in crosscut from lower level and from last accounts they were into the ledge 7 feet. The ore prospected by mortar test from $12 to $14 in free gold. This is an old mine which had been abandoned many years ago and is now being operated by Smart & Lane.

The Cambrian Co. have started a shaft from the tunnel level, also started another tunnel from the Lotus grade which will intercept main ore body several hundred feet deep. The mill is running steadily.

The Grizzly Flat gravel mill and mine is now being operated by lessees. The gravel runs about $4 per car. After paying expenses and royalty to the company the lessees divided over $4 to the man per day.

The Minnehaha mine is still paying line and the owner brings in a bar of gold every week. The ore mills from $12 to $18 per ton. This was an old mine that had lain idle for some time, but was bonded by a young man who had little or no experience but lots of push, and it is said he has taken out money enough to pay for the mine and mill in about one month.

The Larkin mine is going along as usual. The mill is running steadily and the mine looking well on the 600-foot level.

They are cyaniding forty tons per day at the Vanderlia mine and have ore enough in sight to last for years.

Senator Chapman & Parker have started their new gravel mine one and one-half miles east of Placerville. It works splendidly and they feel much elated over their prospects.

The Kohn & Kimball mine and mill are running as usual with good results. They are working thirty-two men.

The Landecker gravel mine is taking out some fine nuggets. I saw several ounces yesterday; the smallest was about $2.50 and the largest about $20.

At the Union copper mine, below Lotus, they are working a few men, and they have 29 feet of gray and peacock copper in the lower crosscut that will average from 10% to 50% copper and $5 to $80 in gold. It is said that this property has been sold and the first payment has been deposited with Wells, Fargo & Co., S. F.

The Wren & Proctor copper mine is having the shaft sunk deeper and they are exhibiting some fine ore that is said to come from the bottom of the shaft.

At the Union mine twenty stamps are running in the day time and they are putting up a new hoist.

A clean up of a twelve-days' run at the Bluebird mine by lessees is said to run about $4.50 per ton.

The big mill at the Bluegauge was started up to-day. They have large quantities of low-grade ore which can be mined and milled cheaply with free water power and plenty of timber on the ground. The Supt. has let a contract to mine and deliver to the mill not less than 100 tons per day at 15 cents per ton.

They are meeting with good prospects in the old Washington mine. It assays from $5 to $10 per ton. This old mine turned out some fabulously rich ore in the early days of the county.

The Ribbon Rock is being developed by Hayward & Davis. They have some rich ore, but no large bodies have yet been found. This is a Mother Lode proposition and bids fair to make a good mine.

The Poverty Point is running fifteen stamps constantly. They have large quantities of low-grade ore yielding a margin of profit to the lessees.

The Orofino Big Canyon mine is running thirty stamps and it is believed to be paying well. This property belongs to Hayward & Lane.

Placerville, Feb. 1.

Miners at Grizzly Flat have leased the McDonald gravel mine. In January they realized $4 a day to the man.

At Grizzly Flats the Grizzly gravel mine is being worked with good results; likewise the Eagle King mine.

FRESNO COUNTY.

The Royal Co., near Coalinga, at a depth of 1000 feet, has struck gas of such compression that it rose above the derricks, regarded as an indication of oil.

KERN COUNTY.

Randsburg Miner: The Wedge has milled thirty-seven tons at the Red Dog. Result—two bricks, $1800.——The new mill on the Pinmore is nearly ready.

A gusher of light gas oil has been struck by the Petroleum Center Oil Co. at 802 feet.

Engine No. 1327 was equipped at the Southern Pacific Co.'s Kern City shops with the new burners, to use crude oil instead of coal, and had a successful trial trip last week.

MARIN COUNTY.

Near Bolinas the Golden Crown M. & M. Co. is reopening an old copper mine.

MARIPOSA COUNTY.

At the annual meeting of the Merced G. M. Co. at Butte, Montana, 73,379 of the 100,000 shares outstanding were represented. A. S. Bigelow, W. J. Ladd, G. H. Lyman, J. G. Ray, J. S. Bigelow, T. Hopkins and F. Klepetko were elected directors. The purchase by Supt. Mills of a number of mining claims, real estate and water rights was ratified and the actions of the directors during the past year approved. Of the property the Boston News Bureau says, epigrammatically: "Much depends now as to whether the vein widens out materially. If it does, there is a probability of a large paying mine, if not, of a sure but small paying mine."

MONO COUNTY.

In the Blind Spring Hill district several cars of ore, running 600 to 800 ounces in silver, have been shipped to Selby's. The Tower mine has been pumped out and will be worked from the new shaft, which has been sunk 300 feet.

The Castle Peak is a producer. The Arnot will put up a large mill. The Meadow View 5-stamp mill is expected to begin in May.

In the Standard mine for week ending Jan. 27: No. feet drifts, 43; tailings assay, $7.66; concentrate assay, $126.93; men employed, 115.

The cyanide plant at Bodie had a long run this season, closing down last week for the winter.

NEVADA COUNTY.

G. Murphy has bonded the Emma quartz claims, formerly the Junction, on the San Juan ridge, for $25,000.

H. S. Brown, of the St. Patrick mine at Washington, has resumed work. The ledge is nearly 100 feet wide, the ore low grade.

The Pacific Improvement Co. has about 120 men at work near Floriston building the dam across the Truckee river—the preliminary work to transporting power to the Comstock.

Grass Valley Union: The vein has been encountered at the Grey Eagle mine, near Maybert. Mgr. J. G. Cohoe has run a tunnel through hard rock 600 feet.

PLACER COUNTY.

At Gold Run the Inskip M. Co., E. A. Moody Supt., is putting in its hydraulic rig and expects to start up soon.

At the Hidden Treasure mine Supt. Power has cut a chamber 20x30x12 feet in cement, where electric hoisting machinery will be placed. The main tunnel is now in over 8000 feet.

The Boston & South Dakota G. M. Co., which declared a dividend of 1% Jan. 23, is working a mining property in the Forest Hill divide. The South Dakota mine works the same conglomerate that the Homestake Co. has wrought for years. A 40-stamp mill has been erected there and twenty stamps are already in commission. The Weske tunnel property opens two ancient river beds in the base of the mountain. The White river channel is now being worked. The Blue river bed will be drained by the present owners.

J. Ross is running a 5-stamp mill at Ophir on surface rock. The stamps weigh only 125 pounds each. Seventy men are working at the Zantgraf. Twelve men are kept constantly timbering. The mine is paying its usual dividend.

S. C. Laird of Loomis is operating on a bar in the American by the hydraulic process.

PLUMAS COUNTY.

F. R. Moody, of the Four Hills mine at Johnsville, has a large force of miners at work.

At La Porte there is not an idle miner, the late rains having set all the mines going. The Dutch mine, Mgr. Holgate, is busy.

Port Wine and Scales, in Sierra Co., are equally busy.

C. E. Pike has men at work raising the debris dams of the La Porte Gold Gravel M. Co., on Rabbit creek.

SAN BERNARDINO COUNTY.

Silver Reef, Black Hawk mining district, geologically has but few counterparts, being a bed of calcareous and silicious material, a deposit from hot springs. The formation is about 100 feet in thickness, and has been developed to nearly this depth by shafts. The ore occurs in zones or bands of mineralized calcspar, and is chiefly chloride and chloro-bromide of silver.

SAN DIEGO COUNTY.

Wm. Brand is experimenting with tailings from the National City Reduction Works.

SANTA CLARA COUNTY.

At the old Guadalupe quicksilver mine, which has lain idle for fifteen years, machinery and furnaces are being put in order, an air pipe will extend from the hoisting works across the creek to operate

by compressed air a hoisting engine in the reduction works.

SHASTA COUNTY.

(Special Correspondence).—The Black Spider M. Co., operating near Keswick, are placing a 400-gallon capacity pump on their property. Machine drills will also be placed within a few weeks.

G. Reinhaus last week bought the Pick Up and four additional claims on French Gulch for $2039.61, and a half interest in the Bulwer and Virginia claims for $2042.86.

It is locally stated that the Mt. Copper Co. will soon begin the erection of a building in which to establish a banking house.

At Bully Hill the DeLamar Co. is building stall furnaces for a preliminary test of ores, to determine upon a process best adapted for the treatment of their output. It is reliably stated that Supt. Oxnam has selected a smelter site and reported the same to headquarters.

Redding, Jan. 31.

A gold nugget unmixed with quartz, and valued at $304, was found this week by Dow & Julian while sluicing on the north bank of Brandy creek

The roasting stalls at the DeLamar mines, at Copper City, are finished. An experimental roast will decide what system shall be used and what sort of flux shall be required. Mgr. Oxnam wishes to know whether the ore can be treated by the stall process, or whether it shall be necessary to resort to heap roasting. The former owner shipped his roasted ores to the Keswick Smelter. Capt. DeLamar will build his own smelter.

SIERRA COUNTY.

The Gold Bluff mine at Downieville has forty men and twenty stamps at work. It is owned by J. Rosenfeld's Sons, who are also operating the Triple Pocket mine, in Slug canyon, near Downieville, where ten men keep a 5-stamp mill going.

The Twin Eagles mine, near Sierra City, will soon have a 10-stamp mill in operation.

A new tunnel is being put in by twelve men at the Mammoth Springs gravel mine.

The Sierra Butte mine is running twenty stamps.

SISKIYOU COUNTY.

The Dewey gold mine, near Gazelle, recently sold to Mr. Sothers, a banker of Boston, for $125,000, is in charge of Supt. Boyle. The present force of twenty men will be increased. In the spring an 80-stamp mill and chlorination or cyanide works will be erected.

The Journal says that the Siskiyou M. Co., working a hydraulic mine on Clear creek, below Happy Camp, realized $8000 in their last clean-up.

SOLANO COUNTY.

Alf. Tregidgo is reopening the St. John quicksilver mine, near Vallejo. He says that the mine was worked continuously for seven years to April, 1880. During that time it gave employment to over 100 men steadily and produced 11,528 flasks of quicksilver. The lode that carries the cinnabar is sandstone, lying between serpentine on the west and magnesian schist on the east. Mr. T. says it has been developed 2800 feet on its course to a depth of 400 feet. The mine was worked by a system of tunnels to a depth of 210 feet, where the lowest, or drain tunnel, intercepted the vein 1100 feet from its mouth, and encountered a chamber of ore that was followed up for a distance of 80 feet. A double-compartment shaft was sunk on it to a depth of 180 feet below this tunnel level. The ore chute is 135 feet long; average width, 8 feet; 125 feet from this chute southeasterly on the course of the vein is the San Miguel chute, that has been followed down from the croppings to the bottom of the mine—400 feet. A winze has been sunk on this ore body from the main tunnel level 180 feet and connections made with it and the main shaft on the 130 and 180-foot levels, the present bottom of the St. John mine. The ore from these two chutes yielded 2⅞% quicksilver, at the present price equivalent to ore worth $40 per ton. Mr. T. has completed reopening this tunnel, a distance of 1120 feet, the entire length of which is newly timbered with 8x8 square timbers, 4 feet apart. They will now start pumping, and, after unwatering, sink another lift, during which time the furnaces will be renovated.

TRINITY COUNTY.

P. M. Paulsen of Weaverville has sold to the Last Chance G. M. Co. of New Jersey property in the Douglas City and Lowden Ranch mining districts, including the following placer mining claims: Ohio Flat, Last, Crown, Goodyear, Little Creek Outlet, Union, Gold Dollar, Vizthum Gulch, Bald Point, Hughes, Union Hill, Union Hill No. 2, Union Hill No. 3, Mabie, Roe, Vizthum Homestead, Red Point, one-half Dutton Creek and Excelsior, comprising about 1500 acres, with numerous water rights and ditches from Grass Valley creek and the South Fork of Grass Valley creek. The purchase price is $125,000. The company agrees to build a ditch, capacity 2500 inches, to the mine by July 1, 1900; $10,000 down, the entire balance of $115,000 paid by September, 1903.

TUOLUMNE COUNTY.

(Special Correspondence).—The MINING AND SCIENTIFIC PRESS correspondent spent several days in an inspection of the mines about Groveland and Big Oak Flat, in the East belt district, a region once famous for its placer gold yield. The early quartz miner opened good properties, but, after working the oxidized material near the surface, which in some instances yielded enormously, little was done in deep mining development. All this has been changed, and now the Big Oak Flat and Groveland districts show as much activity in quartz mining than any like area in the county. This is largely due to J. M. Meighan, who three years ago began systematic work along the line of permanent development. He interested Boston capital in the Mount Jefferson mine, near Groveland, showed that there was a valuable ledge in this claim and that the property would liberally reward investors. There followed development of other properties, and in nearly every instance the result has been encouraging.

The Mount Jefferson has a shaft 300 feet deep, drifts have been run from 150 to 250 feet to east and west and upraises added and good ore has been found. There are now in the ore bins, or stacked up ready for reduction, at least 5000 tons of this ore. A 10-stamp mill, erected under the superintendency of H. M. Stanley, is ready to begin. In the mill are four concentrators, a steam hoist and the requisite pumps. J. M. Meighan is Supt., E. Berry foreman. The same management controls the Pauper's Dream, or the Accident mine, near Big Oak Flat. This latter property is not so fully developed as the Mount Jefferson.

The Longfellow mine, at Big Oak Flat, has been a bullion producer for months. For its hoist it utilized a steam threshing engine, buried "up to the neck" in the earth. Steam is fed to its cylinders from a stationary boiler. The old threshing engine quivers as it hoists the ore skips from a depth of 473 feet in the shaft, but it seems to "get there" all right. Of course, the company will soon replace this relic of bygone days with a modern hoist. The Longfellow has plans for adding ten stamps to its present equipment of ten, and they will also put in a cyanide plant. All of the ore in the ledge, which is from 2 to 12 feet wide, is worked, the values being obtained mainly in the batteries and on the plates. The sulphurets are low grade, running $25 to $30 per ton. The ore carries some tellurium. Ore cars from the bins to the mill are run over a tramway by gravity, the loaded car hauling the empties to the top, the motion being controlled by a brake. The Longfellow is owned by Glasgow people. The Gen. Mgr. is A. P. Dron; T. F. Coyle, mine Supt.; C. F. Leithold, metallurgist.

Another Scotch company in the district is one which owns the Little Wonder and the Abbie L., both near Big Oak Flat. At the Little Wonder they are putting in a new hoist. They expect to put up a 10-stamp mill. The main shaft is 160 feet deep. The vein is 4 feet wide, with ore averaging $8 per ton free gold, and sulphurets from $100 to $500 per ton. The Abbie L. is an extension of the Mississippi.

The Rhode Island mine at Groveland, and the Mississippi at Big Oak Flat, owned by Boston people and both under the superintendency of Sylvester Carlon, are being developed. At the former sinking is done with a two-horse whim. A double steam hoist will be put on. The shaft follows the vein at an angle of 72° and is down 70 feet. Drifting will be begun at a depth of 200 feet. This is one of the old locations of the district, partially developed and then abandoned. T. R. Reid, postmaster at Groveland, is foreman of the work.

The Mississippi is at Big Oak Flat. Here the finest hoist in the camp, capable of sinking 1000 feet, has just been completed, with a gallows-frame 50 feet high and equipped with new machinery throughout. J. C. McLaughlin is foreman.

The Mack mine, overlooking Big Oak Flat, is a promising property. Extensive improvements are planned. The shaft is down 400 feet on the ledge, from which level, as well as from upper levels, drifts have been run, in some instances to a distance of 400 feet each way. There is a second valuable ledge in the ground and a crosscut will tap that. Within a year the present steam hoist will be replaced by a more powerful machine, and a 10-stamp mill erected with foundations for twenty stamps. E. Hirshler is Pres. of the company. The equipment will be run by electric power if available. C. Lang is Supt. of the company, which also owns additional patented ground in the locality.

The Four Oaks mine, half a mile southeast of Big Oak Flat, is another promising prospect. With steam hoist and pump a shaft is being sunk, now down 110 feet. Drifting and crosscutting are being done. Free gold shows in the entire width of the ledge, which is in slate. The stockholders are largely railroad and express people of the Bay cities, besides a block of stock owned by General Shafter. It is supposed the Four Oaks is a parallel ledge to the Mississippi, being 800 feet south. Work was begun here last September. D. R. Shafer is Pres. of the company; his son, C. S. Shafer, Supt. Mr. Shafer owns additional locations on the same ledge, which are now bonded to the Kern & Trinity G. M. Co., who will begin work Feb. 1st.

The Nonpareil mine, one mile north of Big Oak Flat, is the property of the Longfellow Co. The shaft is down about 90 feet, in a decomposed slate, which shows small colors in nearly every panful. The ledge is 30 feet wide in places. The average mill result in the working of the ore is $6 per ton. This ore is soft and easily worked. It will be hauled to the Longfellow mill, and mixed with the harder ore there obtained. A tramway is to be built between the two properties. A steam hoist will also replace the horse whim. C. F. Leslie is foreman at the Nonpareil.

L. F. White, of Groveland, has bonded to W. J. Grahame, formerly of San Jose, the Duleek mine, now managed under the name of the Experimental M. Co. The mine is four miles northeast of Groveland. Mr. Grahame will develop the property.

The Bicknell is one mile southeast of Big Oak Flat, bonded by E. E. Bronson of Colorado. The vein is 36 feet wide and assays well at the surface. Mr. Bronson will begin work in the spring.

The Kanaka, six miles northeast of Groveland, is considered by local people an excellent property. Its 10-stamp mill was destroyed by fire last summer. The mine is owned by Fresno people.

Mecartea Bros. and W. Dodge of Big Oak Flat have bonded to San Jose parties a group of mines located in the East belt. They will begin work at once.

B. Stine, J. B. Demartini and J. Jenney own the Gold Run mine, located one-half mile east of Groveland, on which prospecting is being done, with intentions of larger operations in the spring.

Columbia, which was in early days one of the famous placer mining camps of California, having a population of many thousands, is to-day an interesting region to visit, and is beginning to assert its importance as a quartz mining district. The immediate site of the town was never mined away, and the finding of gold nugnuts, or "chispas," as they are called, in the streets and dooryards, after a storm, is no infrequent occurrence. Several valuable chispas have been picked up this winter. One of the largest nuggets ever found in California was discovered at Columbia.

The Golden Era, eight miles northeast of Columbia, and owned by Thos. Conlin and Ben Pownall, is considered one of the most promising properties in the middle east belt. It has a 5-stamp mill and requisite machinery. Work was temporarily suspended during the winter.

Fourteen men are employed at the Mountain Lily mine, on Five Mile creek, near Columbia. They are driving the lower tunnel ahead to tap the main shoots. A 5-stamp mill is kept at work with good results on ore from the upper levels.

Columbia, Jan. 27.

YUBA COUNTY.

The Miller quartz claim at New York Flat is bonded to the Miller M. Co. A shaft is to be sunk 400 feet by Supt. Widner.

The Emma quartz claim in Nevada county and three adjoining locations—two in Yuba county near North San Juan—have been bonded to G. Murphy for $25,000. The ledge gives mill tests of $3 a ton.

COLORADO.

BOULDER COUNTY.

In the Rosa Lee, near Sunshine, while working in a new portion of the mine, the owner says he has opened a streak 6 inches wide of tellurium ore that runs $2 a pound.

CLEAR CREEK COUNTY.

The Idaho Springs Gazette thinks that the prospect for an early starting up of veins cut by the Newhouse is good. Sufficient tests of ore have been made to demonstrate that the depth gained—2000 feet—has not deteriorated the ore values. As high as four to five ounces gold have been obtained and the zinc and lead streaks have shown 36% for the one and 60% for the other which would make the future of the Newhouse pass the guessing point. The tunnel progresses at a daily average of 5 to 6 feet. With depth it has also been demonstrated that mother veins, only, hold their strength. In fact, as the trunk of the tree, each mother vein has spread out its branches near the surface. Locators of these branches, although they had paying mines in the main, will find upon proving up that they were only offshoots from the big trunks below and that their holdings were simply superficial. While this will be disappointing to many the final result will not affect the community, as a whole, as the ore will all have to come out. Seaton mountain, as those acquainted with it know, is a network of veins upon the surface. It was well named the "treasure vault," for hundreds of poor men made stakes by working the numerous surface pockets. And doubtless those surface pockets will continue to benefit many for years and years to come as they seem to continue with depth and are the property of the owners until merged into the main vein or veins at an as yet unknown depth. There is a difference of opinion as to whom belong the veins cut in the tunnel and the courts may be sought in some cases. But the better plan is always to consolidate in some way or other or arrange for the deposit of royalties, rather than obstruct operations. The progress of the tunnel from now on will be watched with interest, as there are some big gold producers ahead. Should large and valuable ore bodies be cut, and such an event is not improbable, a quickening all along the line will immediately follow in that section.

FREMONT COUNTY.

W. H. Foley will build a chlorination plant at Canyon City, capacity 150 tons per day.

GILPIN COUNTY.

At Central City shafthouse thievery is frequent and mine managers have resolved that they will make an example of the first offender caught. One mine reports the loss of 500 feet of almost new rope from off the drum of the engine, and a sheave frame from another mine; after the thieves had stolen oil cups and brasses from off the engine, they let the skip-car go down into the shaft, smashing things. It is not so much the amount stolen as the amount of damage which naturally follows, as the thieves do not hesitate to spoil $100 worth of machinery, and more sometimes, to get a few brasses. One of the boldest acts happened to a mining man while looking after his property. At one of the mines work was susperded and he descended the shaft to take a look at some workings. After being down only a short while he retraced his steps up the ladderway and when he reached the place where the first 12-foot ladder ought to have been he found it missing, some one having taken it while he was down in the mine. Fortunately he was well acquainted with the shaftway, and after hard work managed to get out.

Mining Record: C. Poulot, of Paris, who has been in Colorado three years making efforts to secure rare metals, has given up and returns to France. Mr. Poulot operated the Wood mine some time, getting a number of shipments of valuable uranium ore. Several months ago uranium was discovered in the vicinity of Paradox valley and the mines were secured by Mr. Poulot and his associates, who spent considerable money in their development. He says that the ore did not carry a sufficient percentage of uranium to make it pay. He found the ore, selected a ten-ton lot, took it with him to Paris, with the result that he sustained a loss of more than $300. He has wound up the affairs of the Rare Metals Co. and will look for uranium in some other quarter. (The Register-Call of Central City says, regarding this, that there was gross mismanagement, and that bills amounting to over $1600 were left unpaid.)

LAKE COUNTY.

(Special Correspondence).—The Home M. Co. will install a new hoist at the Penrose shaft. It will be 14x16 inch, 72-inch drum, the engine making four revolutions to the drum one. The new pumps are in position and are at work. The drift connecting the Penrose shaft with the Midas workings is finished. It supplies both mines with better air and the output increases in consequence. The output from the three shafts of the Home group amounts to nearly 400 tons per day.

The improvements on the Adams, Maid and Wolftone group are well under way. The new boiler battery, aggregating about 1100 H. P., is practically ready for business. The new shafthouse, enclosing a heavy gallowsframe 78 feet high, is a substantial piece of work. At the bottom of the 1300-foot shaft two powerful pumps are to be put in position, capable of raising to the surface 1000 gallons of water per minute. The 12-inch pipe being used is made to sustain a pressure of as high as 1700 pounds per square inch for the first 300 feet from the base of shaft.

The Weldon Co. are shipping about 2000 tons per month from their Nos. 1 and 2 shafts. The ore is a lead carbonate and iron. The shafts are 600 and 540 feet, respectively.

The Nubian M. Co. are getting ready to ship from their Midland shaft, 500 feet deep, in which a fair showing of ore has

been encountered. Drifts are being run in all directions from the shaft. This shaft cuts the ore body on the west side of the carbonate fault, the ore being an iron and lead ochre. The same company have machinery on the ground to sink a shaft on the P. O. S. to a depth of 500 feet. The Weldon and Nubian groups are on Carbonate hill.

The Iron-Silver M. Co. are restoring the equipment at the old Stevens shaft, which has not operated for eight years. The 550-foot shaft will be unwatered and then sinking will commence. The ores here are an iron sulphide.

Sands, Douglas & McGuire are operating a group of mines in Iowa gulch, which compose the Continental Chief, Horseshoe-Prince, Hill Lode and Silver Cliff, all of which they have leased. The development here, which is quite extensive, is all by means of tunnel work.

The Winnie claim of the Monarch Co., on Little Ella hill, is making small daily shipments of copper sulphide ore, carrying gold, silver and copper values.

Thos. Owens, lessee of the Elk mine, on Breece hill, is operating the property, having already shipped considerable ore from the 540-foot shaft. The ore thus opened is a lead product, but it is the intention to sink deeper, and, if possible, cut the sulphide zone in which the Ibex is operating.

Within the last six months the Denver & Rio Grande Railway Co. and the Colorado & Southern have built belt lines over the active sections of Carbonate, Iron, Breece, Yankee and Little Ella hills, and the principal mines of the district are thus reached by spurs from one line or the other. As a result of this, trestles have been built from all the principal shaft-houses, extending out over the railroad track, by means of which the ore cars from the mines are dumped into the railroad cars.

The Sedalia, belonging chiefly to O. C. Bartholomew, is being put in shape for production. The old stopes are being put in condition for work and drifts are being run into new ground. A fair grade of ore is exposed on every hand.

Leadville, Jan. 24. WASCOTT.

PITKIN COUNTY.

At the Mollie Gibson mine at Aspen ore running 5000 ounces silver a ton has been found in the lower workings.

ROUTT COUNTY.

J. O. Nehring of Battle Lake says that from Sept. 25, 1899, when work was begun on the new shaft in the Rudefeha, to Jan. 15, 1900, the company has sacked $1,058,300 worth of ore, part of which has already been shipped to the smelters.

Steamboat Springs reports considerable interest in news from the new copper camp near McCoy, in the Red gorge, twenty-five miles by wagon road from Wolcott, where a sample of ore from the claim of Robinson & Clark assayed copper values of 22.6%.

TELLER COUNTY.

Cripple Creek district is to have another electric plant, the generators to be driven by water from Lake Moraine. The company will furnish power first to the Gillett mill at Gillett. The location of the power plant will be five miles below Strickler tunnel. There is a 100 H. P. generator there now. An order has been given for three more. It is expected that they will be installed this month.

The Portland mine at Victor still leads, the present output being 170 tons of ore per day, value $50 per ton.

IDAHO.

ADA COUNTY.

Supt. Ingersoll of the Ingersoll & Hamlin M. Co., at Hartville, will build a mill, to be an amalgamator and concentrator. The ore runs $9 to the ton. There are six tunnels on the property.

BLAINE COUNTY.

At the Ætna Mining Co.'s mine, at Hailey, 68% lead, 86 ounces silver and $5.25 gold per ton is returned from a shipment by Mgr. Wilson.

IDAHO COUNTY.

(Special Correspondence.)—Elk City: The Dredger Company on Red river have a large crew of men cutting cordwood for the dredge, and the company state they will probably build another machine this year.

Dixie: A force of men under Wm. Springer has been sinking on the Ajax property for the past two months. At a depth of 60 feet the lead was crosscut and is 18 feet wide, all of which is said to contain a milling value. Sinking is to be continued, and if satisfactory results show up with more depth a mill will be erected this year. The property is owned by Campbell & Finch, the Spokane operators.

Buffalo Hump: Very little work is going on in this camp this winter. Clark & Sweeny have a crew doing assessment work on a number of claims. The Boston Company are working the St. Louis, which they recently purchased for $30,000.

Florence: The dredge on Black Sand creek will be ready to make the gravel fly as soon as the snow is gone. Little Slate creek has been thoroughly prospected by a Portland company, and they will put in a dredge this season.

Newsome: The Iron Crown mine, which produced $26,000 last season in a small mill, will resume operations in March, and it is reported they will install a new mill.

The Newsome & Leggat Creek Co. will commence active work on ditch construction as soon as snow leaves the ground, and expect to get a short run this coming fall.

Salmon River: On the coarse gold channel above John Day's diggings were struck in drifting that yield $30 per pan. This is, of course, pockets, but hundreds of dollars are taken from these rich pockets in coarse nuggets.

Grangeville, Jan. 28.

The Queen of the West lode in Florence has been sold to Eastern men for $10,000. It is the only patented claim in Florence and covers part of the townsite.

W. H. Young of the Boston & Buffalo Idaho M. Co., from Buffalo Hump, reports from Grangeville: A winze has been sunk 30 feet from the floor of the south drift on the St. Louis claim, at a point in the drift about 40 feet from the crosscut. The foot of the winze is 130 feet below the surface. The pay shoot is apparently 200 feet long.

OWYHEE COUNTY.

Supt. Irwin of the War Eagle tunnel is driving the tunnel 9 feet per day. It is 350 feet long. The company now employs forty men.

The Trade Dollar Con. M. Co. starts its 10-stamp mill at the Black Jack on February 1st.

MICHIGAN.

Experiments are being made in the Red Jacket shaft of the Calumet & Hecla mine to discover the increase in temperature as greater depth is attained. The shaft is now down 4900 feet. Holes have been driven in the wall rock at intervals of 100 feet, and in these slow-registering thermometers have been placed and the holes in the rock plugged up and sealed. In this way it is proposed to approximate the depth at which the temperature would permit work. At 4500 feet the temperature in the Calumet & Hecla is 85° Fah., while in the Comstock mine in Nevada, at a depth of 2000 feet in some shafts, the temperature is 150° Fah. It is thought that hot springs have a marked influence upon the temperature in the Comstock, and it is probable that the proximity of the Calumet & Hecla workings to the waters of Lake Superior partially account for the fact that at similar depth the Calumet is cooler than any other shaft of which record has been made.

MONTANA.

FLATHEAD COUNTY.

A. M. Esler will begin active operations upon the Cracker, Bull Head and other copper properties bonded from the Michigan & Montana M. & S. Co. He intends to build roads, erect concentrators, sawmills, etc. The properties are in the neighborhood of St. Marys lakes. He is confident of the richness of the ores.

JEFFERSON COUNTY.

The Butte Miner hears that the Elkhorn M. Co. shut down its big mine Jan. 24th. It was run as a company proposition, and employed 500 or 600 men, who are now out of work. It was the only big concern in the Elkhorn district. The mine has been worked by the company that owns it for several years. It formerly belonged to the National Bank people of Helena. They sold it to the London Exp. Co., and the latter has operated it since. There is said to have been enough ore blocked out in it to keep it in operation for two years. The company has taken out the pumps and sold the machinery. The mine is down 2300 feet, and the pumps were on different levels. The mine is a gold and silver proposition, mostly silver.

MADISON COUNTY.

At Pony the Old Joe, Cleveland and Bland claims are bonded to J. F. Cowan of Butte, who has a company. Men are at work sinking a 200-foot shaft to drift both ways on the vein and develop the property enough in three months to ascertain if it will warrant the erection of a concentrator.

SILVER BOW COUNTY.

The usually well-informed News Bureau hears that the Butte & Boston is now producing rather better than 1,000,000 pounds of copper per month, and has prospects of paying a small dividend this year. If copper could be kept above or at 15 cents per pound, Butte & Boston could probably be made to pay $3 or $4 per share per annum. The company now has a working balance of more than $500,000. How far it shares in the expenses of the Butte litigation against F. A. Heinze, which should be costing the Anaconda, the Butte & Boston and the Boston & Montana nearly $1,000,000 per annum, is not generally known.

The Anaconda Co. contemplates the diversion of the waters of Silver lake to supply the smelters. The lake is fourteen miles west, and possesses no natural outlet, occupying a basin in the heart of the mountains. To reach this natural reservoir a tunnel will be driven a mile through the base of a mountain.

The jury in the United States District Court at Helena, on Jan. 31st, returned a verdict in favor of F. A. Heinze, in the suit brought against him by E. R. Morse, trustee, for the recovery of $150,000 damages for the extraction of ore from beneath the surface of the Michael Davitt claim in Butte, where Heinze has been mining from the surface of the Rarus and Johnstown claims adjoining, which he owns. The outcome of the suit determines the title to the rich stopes beneath the Davitt surface, valued at $4,000,000, and a part of the assets of the Great Amalgamated Copper Co.; Morse being presumably a trustee for the company in holding the property, which was sold to him by the receiver of the Butte & Boston Co. two years ago. The trial has lasted since Dec. 11th. The costs of the winning side will be close to $300,000, exclusive of large attorneys' fees. It is a companion suit of the Pennsylvania case, decided by the Butte District Court recently in Heinze's favor, and the ore bodies in issue in both are worth more than $5,000,000. The ledges in dispute are a part of the Anaconda lode. This case was tried two years ago, the trial lasting ten weeks and resulting in a disagreement. The jury was out but a few minutes, and agreed on the first informal ballot. The main issue involved was the question of extralateral rights, complicated by the contention that the veins in controversy were faulted, and not continuous from the surface to the depths, the rich bodies in dispute existing below a level of 600 feet from the surface.

NEVADA.

CHURCHILL COUNTY.

A carload of ore by J. Weyburn from I X L district shows 600 ounces silver with some gold per ton.

ELKO COUNTY.

At the Young America change has been made from steam to gasoline in the hoist. The only objection raised to the new power is in the noise, and that can be obviated by the suggestion on page 743 of the issue of Dec. 30, '99.

ESMERALDA COUNTY.

The Vulcan Copper M. & S. Co. has nine claims at Siegelton. The ore is oxide and carbonate of copper, carrying $2 in gold and three ounces silver. The percentage of copper varies from 4 to 8. A three-compartment shaft is being sunk. Fifty men are employed. A 100-ton smelter is being constructed at Sodaville; a spur track will be run four miles. The company expects to spend $100,000 more before starting to work the ore.

HUMBOLDT COUNTY.

The Kent Mining Co., of Chicago, have bonded the Glen Lyon and Glen Levit group near Golconda. They will sink a shaft 200 feet and run a drift on the 50-foot level 100 feet.

Alviras E. Snow and his associates have bought the Del Monte group of gold-bearing claims for $20,000.

LINCOLN COUNTY.

At the De Lamar mine, the biggest producer in the State, investigation goes on with a view to change the present dry mill process for the pan amalgamation or wet process, and to erect a mill of 100 stamps, which will enable them to handle 300 tons of ore daily. The company is about to handle a lower grade of ores, and the change will enable it to operate at less than cost. One marked result of the change, if made, will be the elimination of the dust problem which has been the destruction of so many lives. The trouble has been not so much the process as the nature of the material handled. The same process is used in the Cripple Creek district without the same deleterious consequences, owing to the difference in the material. The ores at De Lamar are pure silicia, and the dust is composed of particles as sharp as glass dust. With the wet method of treatment this long-standing danger will be ended. At Deer Lodge it is proposed to substitute the dry for the present wet process, but the difference in the material is a guarantee against deleterious effects on the men.

The Eye: The Quartette Mining Co., of Boston, Mass., will shortly erect a 20-stamp mill on the Nevada side of the Colorado river, forty miles north of The Needles, with the intention of working ores from the Searchlight district, fifteen miles west from the mill.

LYON COUNTY.

J. H. Rae, Supt. Dividend Mining Co., will build a crushing and concentrating plant at Como.

The bonding of the Excelsior copper property in Mason Valley for $20,000 has lapsed.

NEW MEXICO.

J. T. McLaughlin, Supt. Santa Fe M. Co. mines, reports working of mine for year ending Jan. 1, 1900, to be 2130 feet. Receipts for year (cash), $500,000; interest, $8581; total, $508,581; expenses and insurance, $69,611; cash at mines, $8370; cash at bank and bankers, $430,600; total, $508,581. Plans have been completed for a smelting works, capacity 150 tons a day, work to soon begin.

BERNALLILO COUNTY.

W. C. Wynkoop, Mgr. custom mill of the Cochiti D. & I. Co. at Woodbury, has a bond on the Good Hope, Hopewell, Black Girl, Allerton and Posey.

The electric light and power plant of the Cochiti G. M. Co. will be in operation April 1. Along the thirty-three miles of poles to Bland, there will also be telephone, electric light and power wires. A branch line will be run to Thornton to meet the Albuquerque line. The line is intended to connect Cerrillos, Madrid, Bland, Santa Fe and Albuquerque.

OREGON.

JACKSON COUNTY.

A contract is to be let for the longest mining ditch in the West, ninety-three miles, beginning above Rogue river falls and terminating at Gold Hill. It will drain 100,000 acres of placer ground, and is to cost $700,000. M. P. Warde says the preliminary surveys have been finished and the right of way secured. For four months past eighteen surveyors, in charge of J. S. Howard, have been running the necessary lines. Estimates are now being made. The territory which the ditch will drain is recognized as rich placer ground, the mines of which heretofore could only be worked during the wet season. The company proposes to furnish electric and water power to quartz mines.

J. R. Huggins, west of Jacksonville, recently took $200 out of a pocket. W. H. Lee extracted an equal amount from a pocket near Applegate.

JOSEPHINE COUNTY.

I. Humason of Portland wants to put up a mill between Rogue river bridge and Houck's mill.

UTAH.

Tribune: Gomer Thomas, State Coal Mine Inspector, has filed his annual report with Gov. Wells. The output of 1899 showed an increase of 204,825 tons over 1898, and Inspector Thomas looks for a heavier tonnage this year. There were no strikes nor lockouts, wages were fairly good and employment steady.

Supt. Carter, Albion M. Co., has an entire new force at Alta. The former crew, with the exception of one member, who remained at the pumps, walked out on him a few days ago and left him almost helpless. According to the retiring miners, it was all because the Albion Co. had availed itself of an opportunity to relocate abandoned territory when the men employed at the mine had planned it. The management of the company confesses to it, but says it did so without knowledge whatever that any one else had his eye on the abandoned ground.

SALT LAKE COUNTY.

Contracts for the construction of the new 300-ton smelter for the Bingham M. Co. are ready, the smelter to be completed in eight months, to cost $200,000. The company has in sight considerable ore, and estimates that it can treat its 6% copper ores at a profit, the gold and silver values paying all costs of ore treatment.

TOOELE COUNTY.

In the Bunker Hill, at Stockton, Mgr. Sharp has begun the raising and sacking of ore samples which show 77.5% lead, 17 ounces silver and $4.13 gold per ton.

WASHINGTON.

SNOHOMISH COUNTY.

W. C. Rutter, Pres. Kittanning C. M. Co. at Index, has a ledge of 4½ feet. A tunnel will be driven on the vein, which cuts into the side of the mountain at an angle of 75°.

YAKIMA COUNTY.

The Star Creek M. & M. Co. at North Yakima has free-milling ore at one of its ten mines owned by the company, yielding $7.50 to the ton.

FOREIGN.

AUSTRALIA.

James Parkinson writes from South Australia that there is no telluride of

nickel in South Australia, alleged to have been discovered last July at Worturpa, and asserts that there is no such mineral as melonite found in Australia. "The telluride bismuth found at Worturpa is only a mere trace, but enough for inexperienced assayers to swear by. All yet found is not one pound in weight, on which all the sensation arose, and only in splashes on rock matrices."

The Queensland Government Analyst complains as follows: "In the beginning of the year a supply of chemicals, supposed to be chemically pure, was obtained from one of the best English firms, but most of the substances supplied were certainly not pure, for example: the zinc contained arsenic, the fusion mixture contained silica, iron, alumina and magnesia, and the citric acid and tartaric acid contained lead; while, although the substances were all sent out here in glass-stoppered bottles with parchment over the stoppers, most of the chemicals had small pieces of paper, sawdust or straw mixed through them. Altogether the order was anything but satisfactory, and led to a great deal of trouble and extra work in purifying some of the chemicals, while others were absolutely useless."

BRITISH COLUMBIA.

J. M. Kellie, member of the Provincial Parliament for the Revelstoke division of West Kootenai, has introduced a bill entitled "For the Regulation of the Length of Hair that May be Worn by Employes in the Metalliferous and Other Mines of British Columbia." The object is to take advantage of the Oriental superstition in favor of the queue to exclude Chinamen from mine workings.

The removal of the duty on pig lead, resulting from Canadian bullion being refined in the United States, has caused the blowing in of the lead furnace at the Trail smelter.

W. A. Pfeiffer, Pres. Pathfinder M. Co. and Mgr. Katie W. G. M. Co., on the North Fork of Kettle river, reports the levels down to 200 feet. The main shaft is on the center of four leads; plenty ore in sight to ship when roads are in condition. A 50 H. P. boiler, engine and hoist will be installed this month; later on a compressor plant of five drills will be put in.

H. McRae, managing director Boundary Creek M. & M. Co., near Greenwood, says work has been resumed on the Gold Bug.

The work was principally on the northeast rim of the deep channel, commencing on the west bank of the Horsefly river, about 40 feet below the river level, and following the gold on the sloping bedrock in a northerly direction, endeavoring to find the source from whence it came.

With powder drifts run ahead of the work, and the mine opened more than last season, he expects next season, with the same amount of water, to handle three times the amount of gravel.

Mgr. Ward states that the plant is now complete, in good condition, the mine on a paying basis, at a cost to the company of about $225,000.

MEXICO.

SONORA.

Two Republics: The Colon gold mine, near Yecora, Sahuaripa mining district, has been sold through Mr. Harper to an English company for $250,000. The syndicate which purchased it have also purchased the Pinos Altos mine, in Chihuahua, for $1,500,000. This is a silver and gold property. The Mulatos mine, in the Sahuaripa district, has recently been sold for $600,000. The Trego mine, near the Colon mine, in Sahuaripa district, has just been sold for $150,000. The Gavilan mine, near Ramona, in the Ures district, has been sold by F. O'Donnell for $10,000. The Paloma Mining Syndicate, of which Mr. Lauder, assistant superintendent of the St. Helena mine, is the head, has taken the La Paloma mine at $180,000. Prospectors and mine buyers are overrunning northern Sonora, and any good property is soon taken. The Santa Edwinge, in the Sahuaripa district, is down 100 feet on the vein in ore that runs 200 ounces in silver.

Recently Declared Mining Dividends.

Atlantic M. Co., $2 per share; payable Feb. 15.

Colorado Fuel & Iron Co., 8%; payable Feb. 15.

Grand Gulch M. Co., $2400; payable Feb. 15.

United Verde Copper Co., Arizona, 50 cents per share.

Boston-South Dakota G. M. Co., 1%; payable Feb. 15.

Last Dollar G. M. Co., Colorado, regular quarterly dividend, $30,000; Feb. 1.

Standard Con. M. Co., California, 10 cents per share, $20,000; payable Feb. 10.

Yukon Crude Oil Co., California, second dividend 4 cents a share; payable Feb. 10.

Personal.

W. S. KEYES has returned to San Francisco from Grass Valley.

MATT W. ALDERSON has returned from Butte to Silver Star, Mont.

PHILIP DEIDESHEIMER has returned from Sonora, Cal., to San Francisco.

W. P. HAMMON, of Oroville, Cal., has returned from an Eastern business visit.

J. FRANCIS succeeds J. F. Littlefield as Supt. Densmore mine, Tuolumne Co., Cal.

E. B. KIMBALL contemplates a mining trip to Chihuahua, Mexico, next month.

ALF. TREDIDGO is opening up the St. John quicksilver mine, near Vallejo, Cal.

A. THURSTON HEYDON has returned from the Yukon region to Placerville, Cal.

MGR. JONES of the American Smelting & Refining Co. is in Salt Lake City, Utah.

J. F. RUER succeeds J. S. Tebbets as Gen. Mgr. Duquesne M. Co., Pima county, Ariz.

E. B. GAGE announces his election as Pres. Cobre Grande Copper Co., Sonora, Mexico.

ASST. SUPT. J. H. HUTCHINSON of the Trade Dollar Con. M. Co., Idaho, is ill in Denver, Colo.

W. PELLEW HARVEY has returned to Vancouver, B. C., from a professional visit to London.

HARRY LANE, of California, is working a quartz claim on Red mountain, Mt. Baker district, Wash.

W. H. TERHUNE of Salt Lake, Utah, has been engaged to operate the Twin Bridges, Mont., smelter.

F. F. SHARPLESS, Gen. Mgr. California Copper Co., expects the Madera smelter to be in operation next week.

W. E. HENDRY is now Mgr. Esperanza, Mexico, mines. The mill has 100 stamps and crushes monthly 9000 tons.

JOEL PHILLIPS is succeeded in the managership of the Junction Silver Co., Broken Hill, N. S. W., by J. C. Moulden.

SUPT. F. F. THOMAS of the Gwin mine, Cal., has resigned his position because of ill health, and is succeeded by David McClure.

JEWETT SCRANTON has been appointed by the Mountain Copper Co., Keswick, Cal., Supt. of the Stowell group of copper mines, near Copley.

JOHN Q. MCDONALD, of the National Gold Extraction Co., Florence, Colo., thinks his new chlorination plant will be finished about April 1.

ARTHUR THOMAS, for several years Supt. British gold mines, El Oro, Mexico, is in Sumatra, examining and reporting upon a mining property upon that island.

WALTER HOVEY HILL, of Grangeville, Idaho, formerly Supt. of the Big Buffalo mine, in the Buffalo Hump camp, has been elected Gen. Mgr. of the Newsome & Leggett Hydraulic M. Co., Ltd.

W. B. VANDERLIP, JR., who for three years has been investigating placer deposits in Siberia for the Russian Government, with headquarters at Vladivostock, returns from San Francisco to Siberia this month.

BEN AND LEWIS WILLIAMS, old California miners, but for many years identified with the Copper Queen of Arizona, have come north, the former being now in British Columbia, the latter sojourning in San Francisco.

E. T. BRADFORD, Mgr. Southern Smelter Co., is in Portland, Or., to investigate a smelter proposition and see what resources Oregon possesses in that line. Mr. Bradford's process is the Loder hot-blast system.

C. W. DAILY, engineer-in-chief Sydney Harbor Works, Sydney, N. S. W., will receive competitive plans for a bridge over Sydney harbor. The bridge is to cost $2,500,000 and a prize of $5000 will be awarded for the best design.

W. F. DURAND of Cornell University has been awarded the first prize for the best technical essay submitted to the American Society of Naval Engineers for his paper on "Electrical Propulsion for Torpedo Boats." The prize consists of life membership in the society and a gold medal.

THEO. F. VAN WAGENEN, E. M., of Denver, Colorado, is making his headquarters this year at Boise, Idaho; he has recently completed preliminary examinations of the Snake river in that State between Blackfoot and Glenns Ferry, with the view of utilizing water power for an irrigation canal.

CHAIRMAN LACEY, of the Congressional House Committee on Public Lands, says it will be impossible to pass general land laws for Alaska at this session, owing to opposition in the Senate. He has prepared a bill which will meet the emergency that has arisen, or will arise, in the Cape Nome and other thickly populated gold fields, which measure, he thinks, will meet the present demands. He thinks his bill will pass without difficulty, as it affords relief for the overcrowded mining districts, where trouble will ensue if proper provision is not made.

HENRY KENNEDY of Homestead, Pa., after an absence of two years in Mariopol, Russia, where he has been engaged erecting a steel mill, says that there is no danger of the Russians becoming competitors of the United States, as they have not the raw material, and are fifteen or more years behind American industrial development.

O. O. HOWARD, JR., Pres. Ratcliff Con. Gold Mines, Ltd., went East this week for estimates on an electrical power transmission plant, to be installed in the Panamint mountains, to operate the mills of the Ratcliff Co. It will require six months to get the machinery from the manufacturers and install same at the mines. It is expected that at the time the electrical plant is ready the present milling capacity of the mine will be doubled. Mr. Howard says that developments at the mine in the lower tunnels are of such a nature as to warrant the erection of a large plant.

CAPT. THOS. MEIN, in an interview with the Oakland, Cal., Tribune, talks freely regarding the Transvaal troubles. He was one of the prominent American miners in Johannesburg at the time of the Jameson raid. Regarding that episode, he says: "The Boers betrayed me and my companions. After they had us arrested, they told us that if we would plead guilty to a certain offense we would be fined $17.50 each. On the advice of our attorneys we pleaded guilty. They then dug up some old Roman-Dutch laws that would have hanged the whole of us. After being imprisoned for six weeks we were allowed to purchase our freedom by paying $10,000 each."

VICTOR M. CLEMENT sailed for England on the 22nd ult. Before leaving he told a reporter that when he was manager of the Simmer and Jack mine, at Johannesburg, South Africa, he asked Mr. Williams why he did not bring out some American wheelbarrows, as all the Rand mines wanted them. Williams said he would if he could get sufficient orders, and promised to look into the matter. He went to the various mines, and as they all wanted American wheelbarrows, he received orders from each and every one of them. This, however, did not seem to wholly satisfy Williams, who then went to the local traders, and told them that he had heard that there was a large demand for American wheelbarrows in the mines there and asked them why they didn't import some. The traders investigated, found that the demand was great, and forthwith authorized Williams to bring them out a supply. The wheelbarrows Williams imported under these combined orders came to nearly a shipload. Upon their arrival he made his first deliveries to the mines, and then turned over to the retail dealers their supply. The latter at once sent notices to the various mines that they had imported a supply of American wheelbarrows, and solicited orders. In every instance the reply was that that particular mine had a supply of the article mentioned sufficient to last for some years. They had been there before, however, and beyond a few remarks about Yankee tricks they took their medicine quietly and with chastened spirits. American wheelbarrows, though, were the cheapest things one could buy in the Transvaal for some time after that.

Industrial Notes.

—The South African war is costing England $5,000,000 per week.

—The rails on the Columbia & Western Railway are laid to Midway, B. C.

—The Santa Fe road will move its shops from Raton, N. M., to La Junta, Colo.

—Oregon's lumber output for 1899 was 669,650,000 feet; Washington's, 723,000,000 feet.

—The Southern California Ry. Co. in '97 showed net earnings of $57,007; in '98, $479,285; for '99, about $725,000.

—It is estimated that a double cable from San Francisco, via Guam, Manila to Hongkong, will cost about $30,000,000.

—Minneapolis, Minn., gets the convention of the United Mine Workers and the Interstate Conference of Operators and Miners in 1901.

—The Cascade tunnel on the Great Northern road in Washington will be 13,253 feet in length; cost $3,000,000. When the tunnel is turned over to the railroad company next October the cars that will run through it will be operated by electricity.

—In answer to about 4000 letters sent out by Rogers, Brown & Co. of New York to their customers throughout the country to ascertain the probable requirements of pig iron this year, consumers indicate that they will melt from 30% to 60% more pig iron this year than in 1899.

—Orders have been placed for two more automatic iron ore shovels for use on the Carnegie docks at Conneaut, Ohio. The great scoop, which is a part of the massive 400-ton machine, dips up ten tons of ore at a time, one machine working ten hours a day doing the work of 100 men.

—During '99 there were 7366 industrial establishments in Japan, of which 2968 employed motive machines and 4398 were without mechanical motive power. The first group includes 274,000 workers and the second 140,000, or a total of 414,000 workers. The industrial consumption of coal has increased there from about 278,000 tons in '93 to over 2,000,000 tons in '99.

—Continued coal shortage in San Francisco and increasing demand in the Northwest is causing active demand for coal properties. Eastern men are buying 1200 acres of coal lands at Sumas, on the extension of the Bellingham Bay & British Columbia Railroad. The Tacoma Eastern Railway will develop the Nisqually coal field, thirty-five miles southeast of Tacoma, Wash.

—Wm. Blackman, State Railway and Factory Inspector for Washington, makes the following statement of wages paid in that State at the mills: Book-keepers, $4 per day; engineers, $3 per day; firemen, $1.75 per day; head sawyer, $4 per day; shingle packers, $2.50 per day; filer, $4 per day; planer men, $2.50 per day; other mechanics, $2.50 per day; talleymen, $2.50 per day; blacksmiths, $2.50 per day; boom men, $2.25 per day; common laborers, $1.85 per day.

—The baled hay shipped from San Francisco for the American army in the Philippines is compressed by a new process. The hay is put up in bales cylindrical in form, about the size and shape of an old-fashioned nail keg, 18 inches high and the same diameter. When baled in this shape the hay is hard as a board. The bales weigh about 145 pounds. The hay is hand-cut in pancake form. The hay pancake or layers, which make the bale, are about ¾-inch thick. The most compact bale of hay put up by the old style required 160 cubic feet of space per ton. The new way hay takes 50 cubic feet of space per ton.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING JAN. 23, 1900.

641,922.—BIT STOCK—W. L. Baumgardner, Watsonville, Cal.
641,757.—CIGAR BOX—M. Blaskower, S. F.
641,935.—LEADED GLASS—Childs & Cantrell, Spokane, Wash.
641,938.—RAISIN SEEDER—C. S. Cox, Fresno, Cal.
641,939.—RAISIN SEEDER—Cox & Langley, Fresno, Cal.
641,951.—LOGGING JACK—A. M. Gilchrist, South Bend, Wash.
641,955.—PRUNE DRIER — F. Hampton, Canby, Or.
641,771.—WAGON GEAR — S. M. Harris, Cheney, Wash.
641,958.—THAWING EARTH—A. Heitzelmann, S. F.
641,960. — EARTH AUGER — J. Herfert, Tucker, Wash.
642,045. — SAWING MACHINE — H. G. Locke, Ukiah, Cal.
641,722.—BOX—A. C. McCandless, Los Angeles, Cal.
641,716.—DREDGER—B. J. Methvin, Tacoma, Wash.
641,990.—ORCHARD HEATER—P. Neyens, Dunsmuir, Cal.
642,006. — FANNING MILL — E. Rouse, Weston, Or.
641,773.—IRONING BOARD—G. T. Simpson, Baker City, Or.
642,058.—LOAD GATE — G. D. Norswick, San Jose, Cal.

Books Received.

"A Text-book of Ore and Stone Mining;" 4to, pp. 744, C. Le Neve Foster, third edition, with frontispiece and illustrations, the object of which, as the writer states, is "to assist students in acquiring a knowledge of the art of mining." Comparison with former editions shows that some of the matter has been re-written and more added. The methods and citations are largely European, and the descriptions apply more to British systems and conditions than to American. The book has value as a reference for such information. Philadelphia: J. B. Lippincott Co; $10.

Latest Market Reports.

SAN FRANCISCO, Feb. 1, 1900.

SILVER—Per oz., Troy: London, 27¾d (standard ounce, 925 fine); New York, bar silver, 60¾ cts. (1000 fine); San Francisco, 60¾; Mexican dollars, 48¼c.

United States—	1898.	1899.
Gold imports	158,163,952	51,194,964
Gold exports	16,194,954	45,379,411
Silver imports	29,131,380	30,844,981
Silver exports	53,797,104	53,461,737

The fact that the East Indian Government will have to buy silver stimulates demand. Indications that the silver reserve of the Indian Currency Department has been heavily depleted and will be further reduced are found in the large sales of telegraphic transfers upon India, further earmarking of gold for the account of the Indian Government and the dispatch of gold direct to India. Out of 16¼ crores of cash reserve only about 7 crores are silver. According to the Statist, should a further two millions of gold be sent to India during the next two months, the silver holdings of the Indian Government will probably be reduced to about 4 crores. Before such a figure is reached, purchases of silver for coinage ought to be made, unless the Indian Government is prepared to incur risks which might bring disaster. The Statist insists the Government must buy silver without delay and have it coined as quickly as possible, and reasons that India ought not to be subjected to further trials on top of the famine, also pointing out that if troubles break out on the Afghan frontier, silver alone will be usable.

COPPER.—New York, Lake, $16.25; electrolytic, $15.75; casting, $16.00; St. Louis, $16; San Francisco, 17½@18.

Mill Copper plates, 23¾c; bars, 25½@27c.

LEAD.—New York, $4.70; St. Louis, $4.70; San Francisco, $4.75; pipe 7½, sheet 8¾, bar 6½c. London, Soft Spanish Lead, £16 10s=4.71c per lb.

SPELTER.—New York, $4.70; St. Louis, $4.70; San Francisco, ton lots, 5¾c; 100-lb lots, 6¼c.

ANTIMONY.—New York, 9¼c; San Francisco, 1000-lb lots, 10c; 300 to 500 lbs., 11@14c; 100-lb lots, 15@18c.

BABBITT METAL.—San Francisco, No. 3, 10c.

IRON.—Pittsburg, American soft, $25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c.

STEEL.—San Francisco, bar, 12c to 20c per lb.

QUICKSILVER.—New York, $52.00; London, £9 14s; San Francisco, local, $51.50 ₱ flask of 76½ lbs.; export, $47.50.

PLATINUM.—San Francisco, crude, $16 ₱ oz.; manufactured, $19@22.

FERRO-MANGANESE.—San Francisco, ₱ ton, $30.

ZINC.—San Francisco, 5¾; slab, 6½c; bar, 8.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb.

TIN.—New York, pig, $28.50; San Francisco, $30; bar tin, ₱ lb, 35c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 40c to 50c.

NICKEL.—New York, 40@45c ₱ lb.

BISMUTH.—New York, ₱ lb., $1.80 50-lb lots; San Francisco, $2.50 to $3 lb lots.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ₱ set; 14 oz., 40s., 11c.

FERRO-TUNGSTEN.—New York, 60c; San Francisco, 75c (60%).

MAGNESIUM.—New York, $3.50 ₱ lb.; San Francisco, $4.50.

TUNGSTEN.—New York, ₱ lb., 75c; San Francisco, 90c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

COAL.—San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs' $10.05; Colorado Anthracite, $14.50.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 34@36c ₱ lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, 1¾c ₱ lb. 66% B; soda ash, $1.60 ₱ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ₱ lb.; blue vitriol, 5½@6c ₱ lb.; borax, concentrated, 7@8c ₱ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2¼c; California refined, 1¾@2c; nitric acid, in carboys, 8c ₱ lb.; caustic soda, in drums, 3@4c ₱ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ₱ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, strictly pure, boiled, bbl., 68c; cs., 73c; raw, bbl., 66c; cs., 70c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 55c; cs., 60c; No. 1 bbl., 45c; cs., 50c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 65c; No. 1 bbl., 52½c; cs., 57½c.

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 1, 1900.

9:30 A. M. SESSION.

100 Caledonia...52c	200 G. & C.....24c
100 Challenge...21c	200 Ophir.....70c
300 Chollar.....23c	100 Potosi.....27c
400 C. C. & V.$1 45	300 Savage.....13c

2:30 P. M. SESSION.

150 Ophir 70c	300 Chollar 23c
100 .....71c	200 Potosi 27c
200 B. & B.....23c	100 H. & N.....31c
100 .....22c	200 Y. Jacket ..21c
200 Savage.....13c	100 Sierra Nev..41c

UTAH and CALIFORNIA

Are two of the most magnetic names in the roll of States, and the best way to reach them is over the Rio Grande Western Railway, "Great Salt Lake Route." As the name intimates, the Rio Grande Western is the only line that passes directly through Salt Lake City on the way to California; and Salt Lake City and the Great Salt Lake are the two points which should certainly not be missed on your western trip, as they contain more interest to the average American than any two other points within the confines of the United States. Study the matter carefully and you will choose the Rio Grande Western for this reason as well as for the magnificent scenery, superb equipment and fast time. It is the popular route during the winter as in summer. Write to GEO. W. HEINTZ, General Passenger Agent, Salt Lake City, for particulars.

A Good Endorsement.

The British Government has recently adopted the Cross Oil Filter, manufactured by the Burt Mfg. Co. of Akron, Ohio, and ordered large quantities for various branches of the Government service. This is a strong endorsement, as the English makes are plentiful and cheap. The Burt Co. state that their business for 1899 increased over 50% above previous year.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, **Money** loaned mines, **Mining** companies organized, their property exported, financed and managed, **Mines,** prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, **Examine** mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and Chemical work done. **EDW. N BRETUNG, Marquette, Mich., U.S.A.** CABLE ADDRESS, EDBER. CODES LIEBER'S, BEDFORD MCNEIL'S, A B C UNIVERSAL COMMERCIAL.

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For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

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Will act as purchasing agent for mining companies.
Will use the benefit of his wide experience in getting the best articles at the lowest prices, securing low freight rates, and prompt delivery.
Will submit estimates on all kinds of supplies.
Will work for either a small salary or a commission, and show a saving greatly in excess of charges.

Wealth Producers.

Copper mining has been more profitable than any other business undertaking.

STATISTICS SHOW THE GREAT RESULTS. WRITE FOR PAMPHLET.

COLONIAL COPPER COMPANY,
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WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,

ASSAYERS AND WASTE PRODUCT SMELTERS,

1661 Larimer St., Denver, Colo.

Write for Donaldson's Assayers' Slag Hammer.

Experienced Mining Engineer (age 40) reports on mines and their economical development; ore dressing; processes; mining machinery and mill construction. References. P. O. Box 971, Denver, Colorado.

WANTED.

Wanted.—Experienced Metallurgist and Assayer.

A practical as well as theoretical knowledge of the treatment of ores by all the principal methods necessary. Address W, Mining and Scientific Press.

Wanted.—A Young Man Who is a Machinist and Pattern Maker.

Good wages. Steady employment. Address NELSON IRON WORKS, Nelson, B. C.

WANTED.—An Experienced Quartz Mine Superintendent, one who is familiar with stamp mills and concentrators, and who is also an assayer and mining engineer, to take full charge of mine and 10-stamp gold mill. Must furnish references, state salary, and particulars. Address "GOLD, Mining and Scientific Press, San Francisco Cal

WANTED—A Second-Hand White Howell Roaster, also a Revolving Drier.

Must be in good repair. Address ARTHUR HENDEY, Agent, Copper Chief Mining Company, Jerome, Arizona.

Wanted.—Foreman for Twenty-Stamp Mill.

One hundred and fifty dollars per month and board. Address THE WM. HAMILTON MFG. CO., 316 S. Euclid Ave., Oak Park, Illinois.

WANTED.—A STAMP MILL MILLWRIGHT.

Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

WANTED.—A COMPETENT MILL MAN

Who can take the machinery for a 10-stamp mill to a foreign country, erect same and run it for six months or longer. State experience, references and salary expected. Address all replies to W. L. L., care of the Editor of the Mining and Scientific Press.

SITUATIONS WANTED.

Wanted.—Situation as Mill Foreman, Assayer or Superintendent of Mine.

Have long experience. Address J. O. STEWART, Danville, Cal.

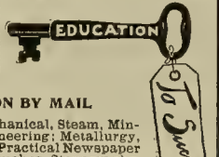
ASSAYER

WANTS POSITION. Good references. Competent in other branches of mining. Address J. D. H., care this office.

Mining Engineer and Metallurgist, technically educated, with fifteen years of practical experience, is open for a new engagement as expert or superintendent. Specialty the treatment of rebellious silver and gold ores. Experienced in designing, building and running reduction works. Speaks and writes Spanish fluently. Address ALPHONSE BENO, P. O. Box 814, City of Mexico.

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if you have the ambition to master it. If you have a thorough knowledge of your trade or business you will succeed in it. You study "after hours" and we will guarantee to fit you to fill the highest places through



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FOR SALE.—DIVIDEND-PAYING, HYDRAULIC placer. Extensive deposits. Old channel gravel, water, pressure, grade, dump, and gold. Rigid investigation invited. Thoroughly legitimate. Banking references. Owner. IDAHO, care of Mining and Scientific Press.

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A BARGAIN.

3500 feet of 16-inch, 5 B. W. G. National Tube Works seamless pipe. Kimberly joints. Immediate delivery.

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40-lb. Relaying Rails with Plain Plates.
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Relaying Rails

For Mines and Street Railways.

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PUTMAN BOOTS

Hand Sewed Waterproof

Black, brown or straw color.

—for Sportsmen—

Leaders for 22 years among Western hunters, trappers, prospectors, miners, and ranchmen. Come in 20 patterns. Possess style, quality, durability. Also Indian Tanned Moose-hide Moccasins. Finest made



Send for catalogue and measurement blank to insure fit.

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STOCKHOLDERS' MEETING.

Notice of Stockholders' Meeting of the Union Hill Consolidated Mines

In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated Mines, a meeting of the Stockholders of this Company will be held at 11 o'clock in the forenoon on Tuesday, the 27th day of February, 1900, at its principal office, 320 Sansome St., room 24, San Francisco, California to consider and vote upon the proposition to increase the Capital Stock of this Company to four hundred thousand ($400,000) dollars in 400,000 shares at the par value of One Dollar each.

JOSEPH H. MOOSER, Secretary.

Dated San Francisco, January 15th, 1900.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

10,000 FEET NEW RUBBER BELTING.

We have recently purchased in original rolls direct from factories nearly 10,000 feet of leading brands of Rubber Belting, slightly damaged, but utility of which is unimpaired. We present the unusual opportunity to consumers of saving 50 per cent in the purchase of their belting. Our prices will astonish you.

ROBERT BRAND & CO.,

(Manufacturers "Minnesota Chief" Threshers).

RUBBER FOR BRAKE BLOCKS. **521, 523 & 525 THIRD ST., OAKLAND, CAL.**

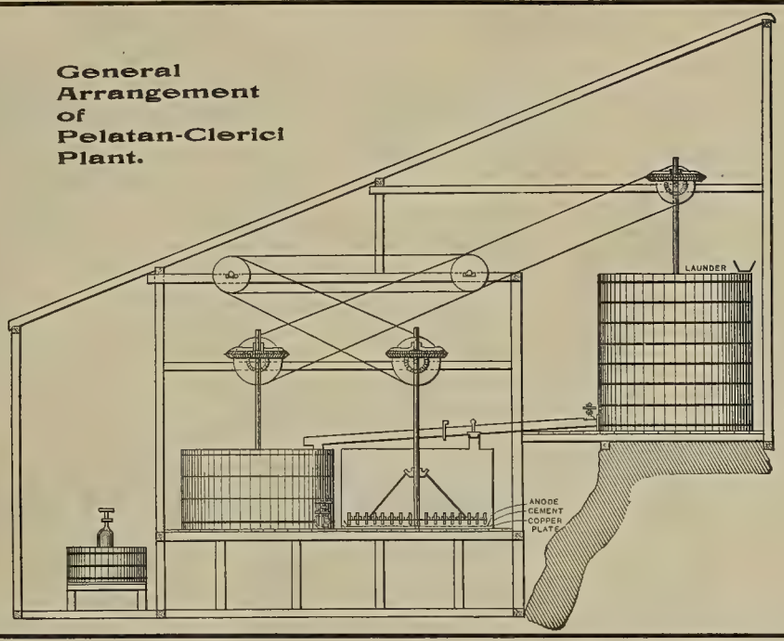
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An iron cement in powdered form, for repairing leaks or fractures in steam or hydraulic work, applied by mixing with water; hardens quickly and expands in hardening. When hard it will with stand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A

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34-36 STEUART ST., SAN FRANCISCO, CAL.....AGENTS FOR PACIFIC COAST.

General Arrangement of Pelatan-Clerici Plant.



The "Pelatan-Clerici" Process

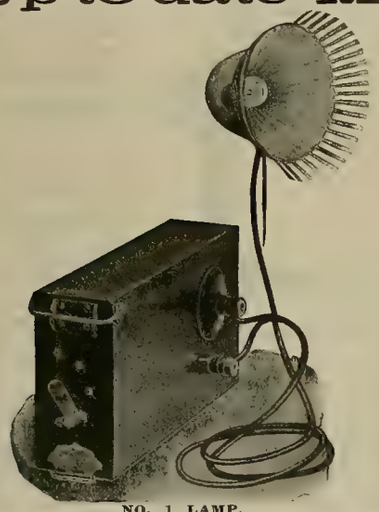
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Saves the precious metals by the simplest, most economical and most efficient process known. No roasting or previous treatment, except ordinary crushing. Extraction complete in from 6 to 12 hours. Extracts equally well both fine refractory gold and coarse gold in the form of amalgam. Makes a greater saving of gold than any other process from raw material at less cost. The electric current and dissolving agent promptly dissolve the precious metals, both gold and silver. Samples of ore tested free of charge. Several mills saving over 90 per cent of values by bullion returns. Simplicity. Economy. Efficiency.

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SAN FRANCISCO,
AGENTS.

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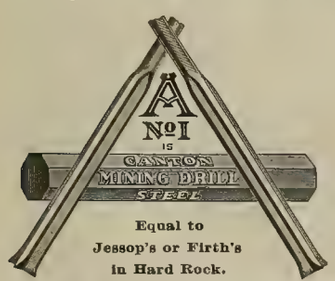
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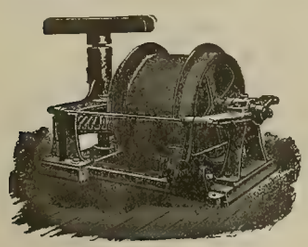
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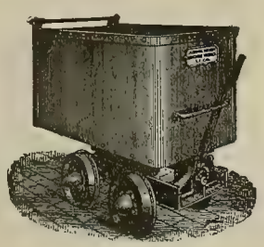
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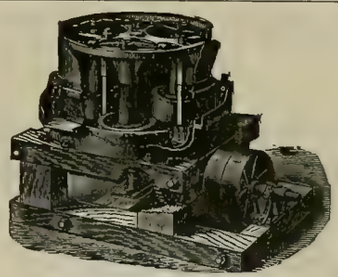


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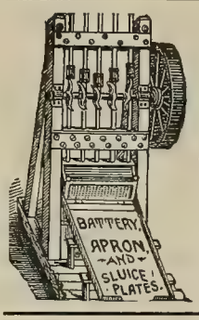
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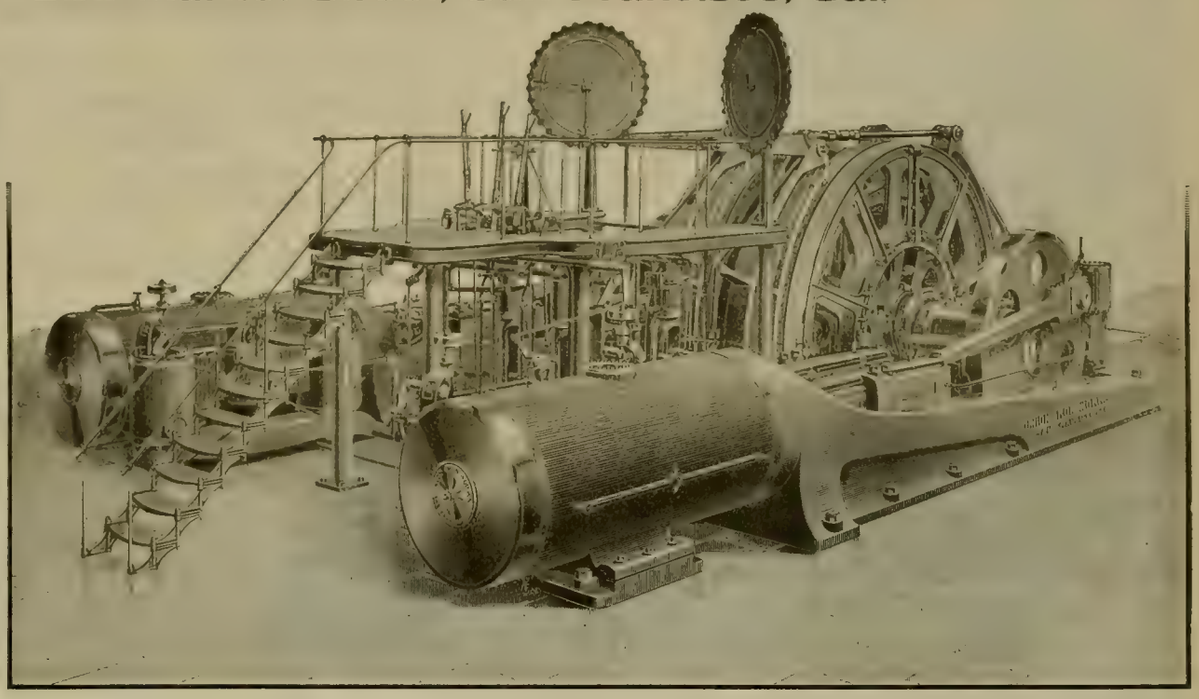
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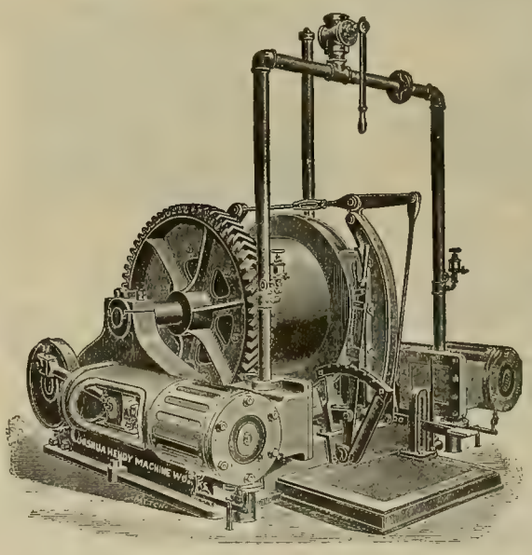
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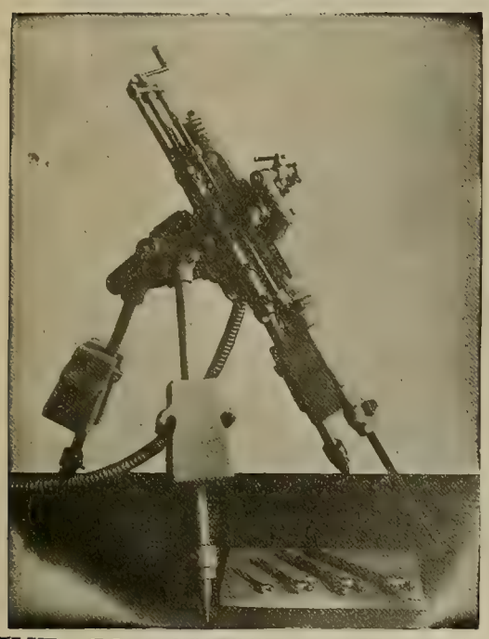


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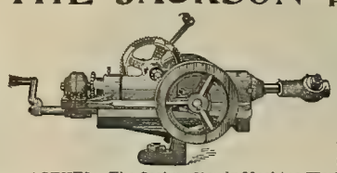
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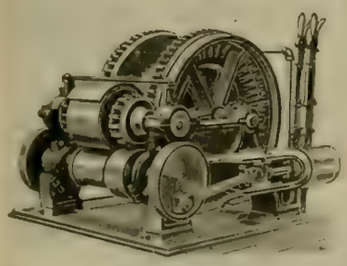
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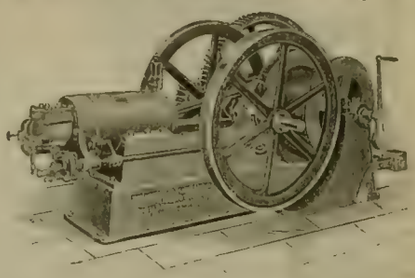
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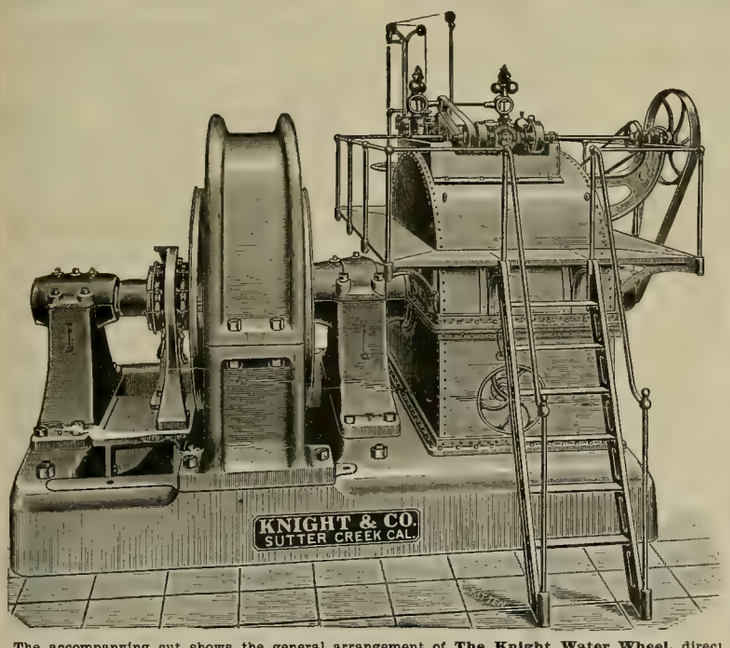
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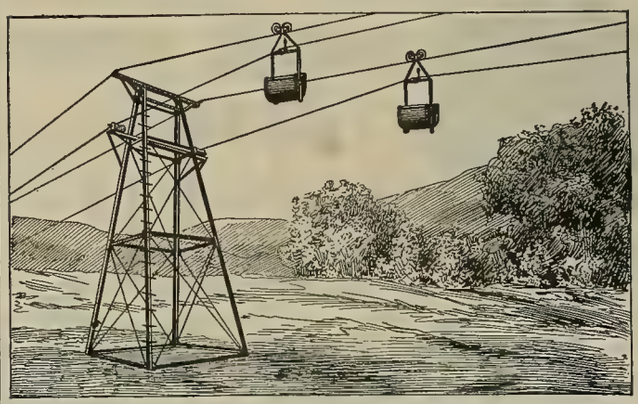
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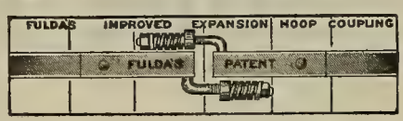
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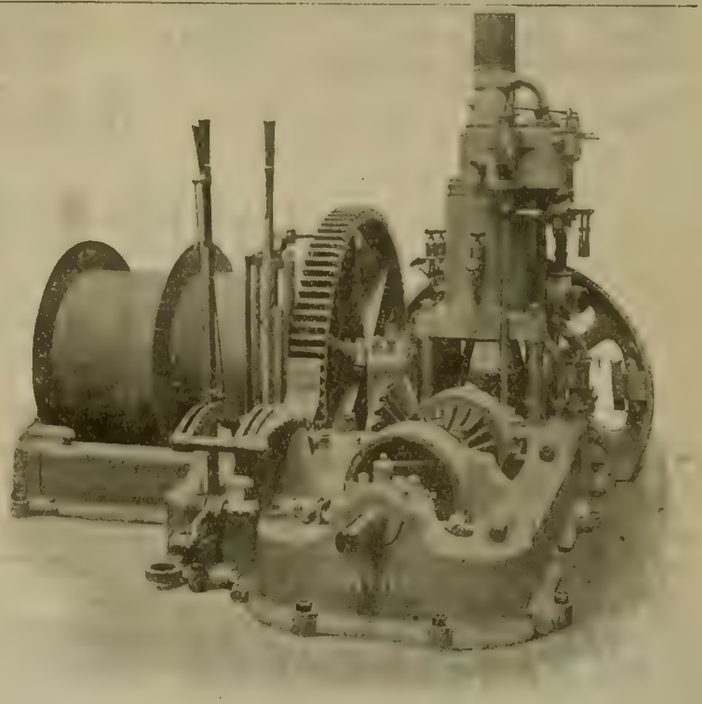
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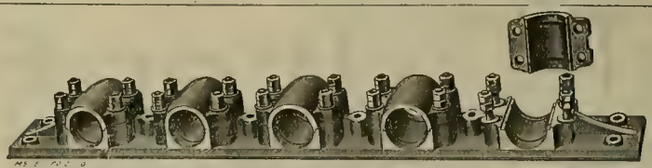
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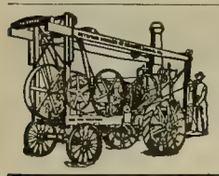
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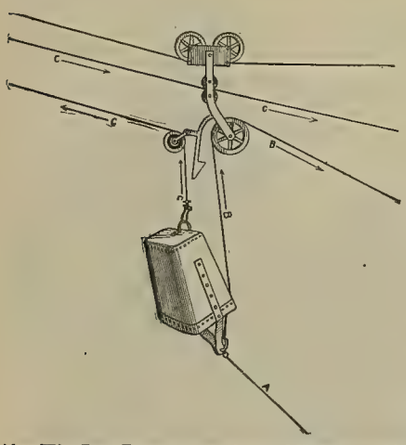
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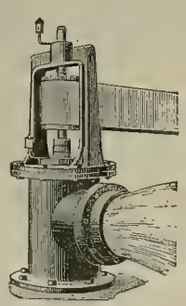
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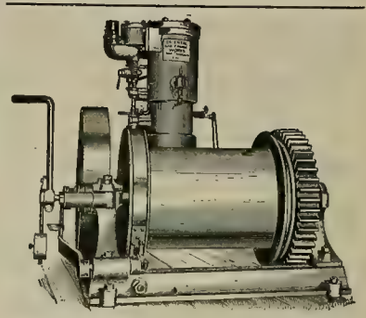
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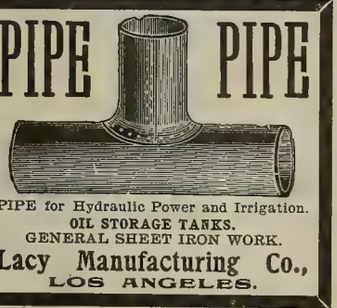


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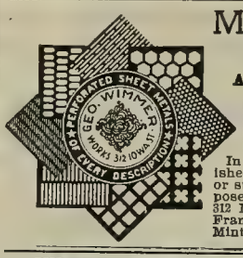
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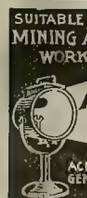


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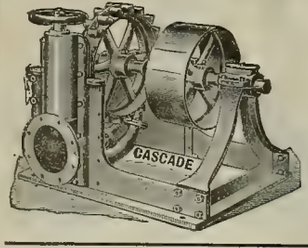
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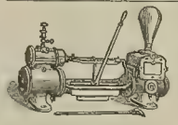
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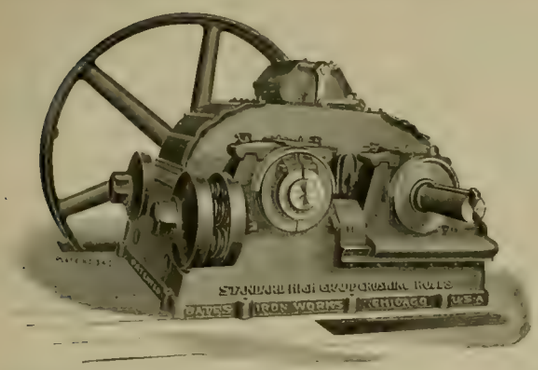
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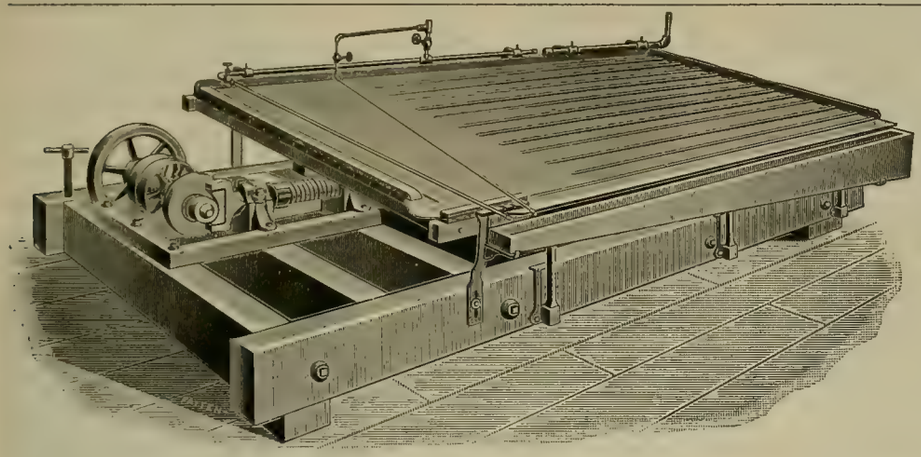


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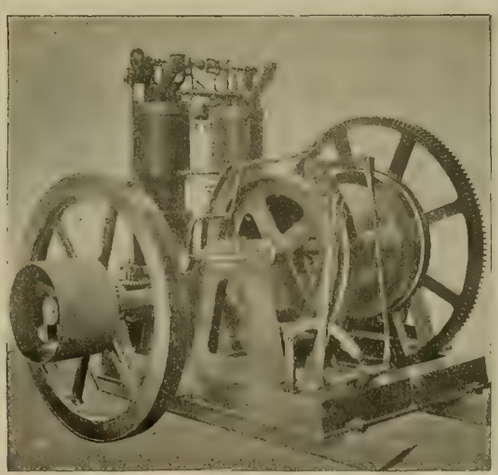
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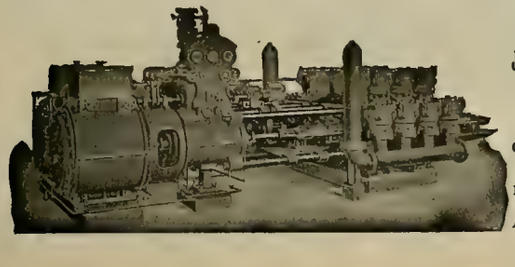
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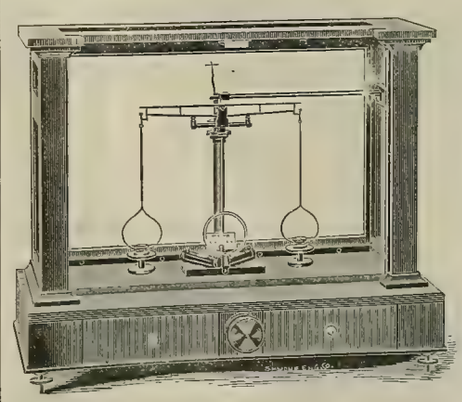


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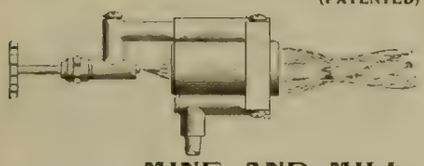
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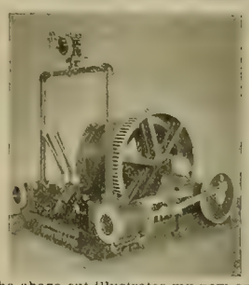
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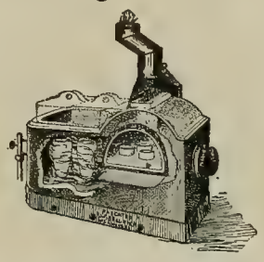
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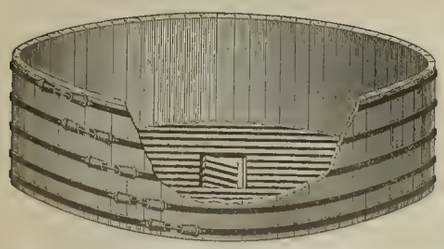
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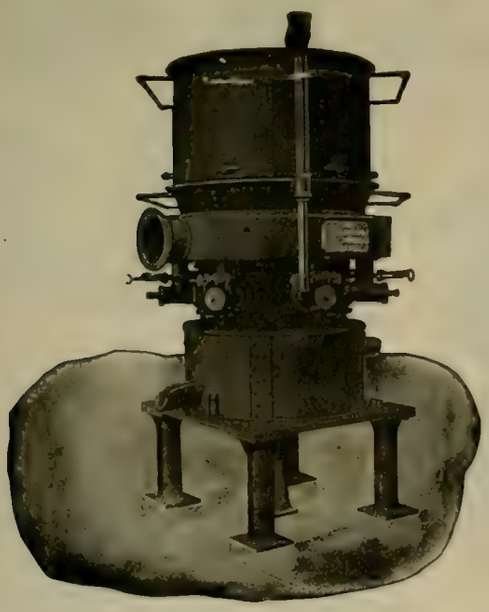
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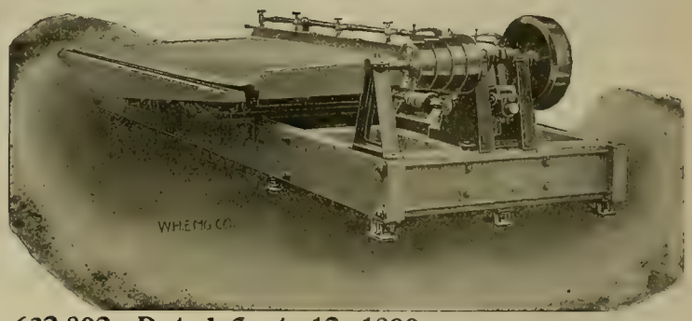
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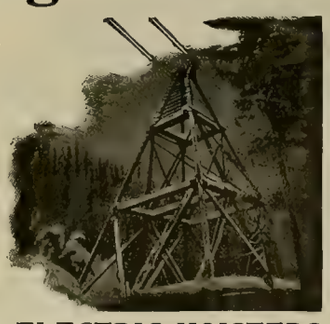
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ASSESSMENT NOTICES.

SOUTH PALOMA GOLD MINING COMPANY, Limited.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Directors, held on the 6th day of December, 1899, an assessment (No. 1) of six-tenths (6-10) of a cent per share was levied upon the capital stock of the corporation, payable immediately to the secretary, John F. Barnett, at Room 22, No. 222 Sansome St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3rd day of February, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on the 19th day of February, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

JOHN F. BARNETT, Secretary.

Room 22, No. 222 Sansome St., San Francisco, Cal.

QUINCY MINING AND WATER COMPANY.—Location of principal place of business, San Francisco, California; location of works, Spanish Ranch, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of January, 1900, an assessment (No. 2) of forty cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 439 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of February, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 5th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

THOMAS QUIGLEY, Secretary.

Office—No. 439 California street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of January, 1900, an assessment (No. 10) of five cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of February, 1900, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 5th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of January, 1900, an assessment (No. 22) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of February, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 19th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1900, an assessment (No. 2) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of March, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, room 36, San Francisco, California.

DELINQUENT SALE NOTICE.

MAY DAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 29th day of November, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Fanny Mayblum	61	50	$5 00
J. P. E. Heintz	57	1,000	100 00
J. P. E. Heintz	116	125	12 50
J. P. E. Heintz	129	4,000	400 00
J. P. E. Heintz	134	500	50 00
J. P. E. Heintz	135	200	20 00
Wm. A. Junker	71	500	50 00
Annie D. Weeks	133	500	50 00
C. G. von Treutler	127	400	40 00

And in accordance with law, and an order from the Board of Directors, made on the 29th day of November, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, Heald's Business College, 24 Post street, San Francisco, California, on TUESDAY, the 20th day of February, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

E. P. HEALD, Secretary.

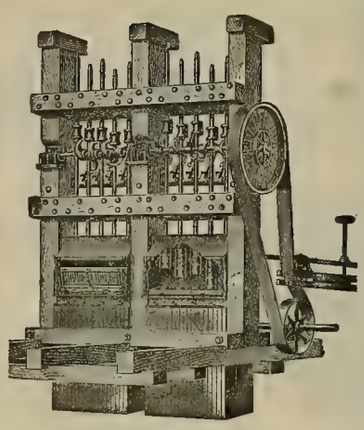
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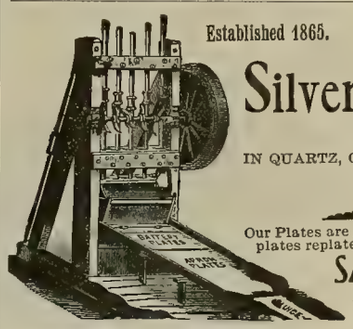
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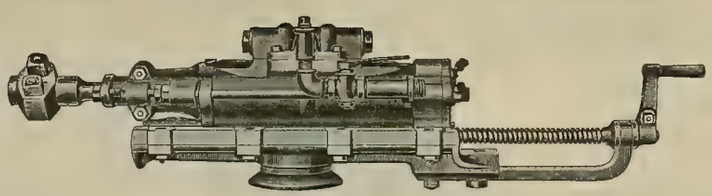
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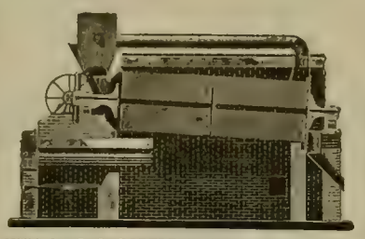
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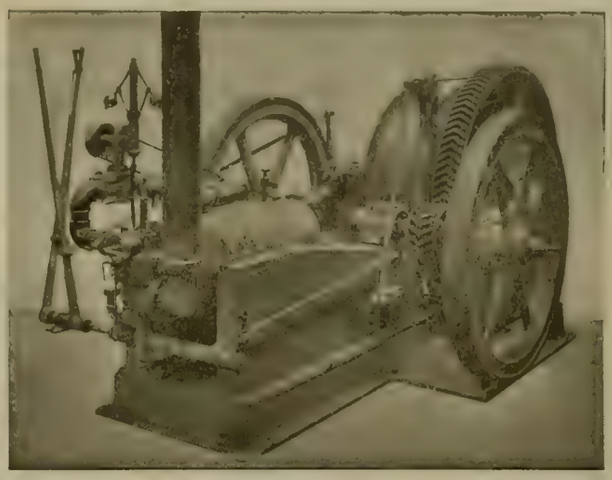
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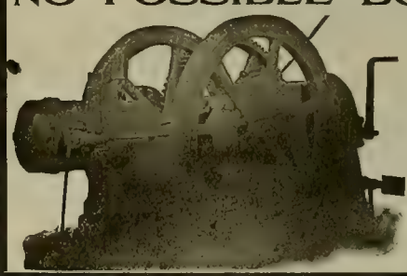
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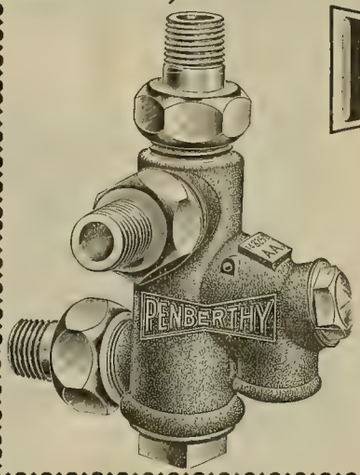
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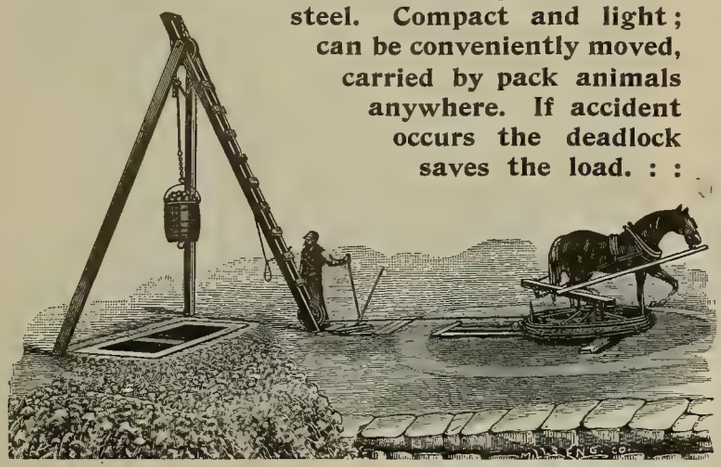
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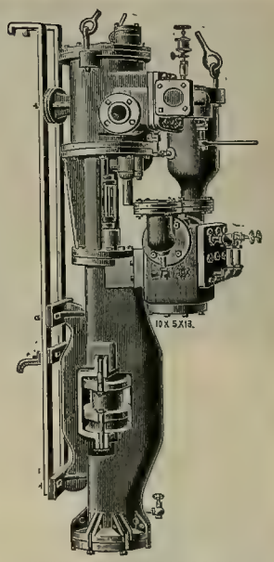
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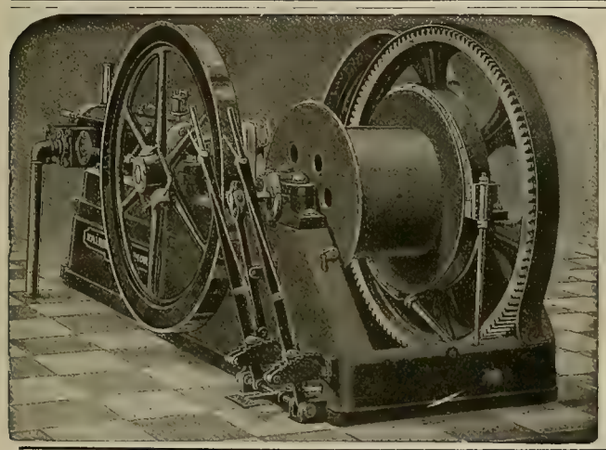
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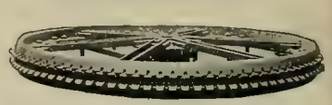
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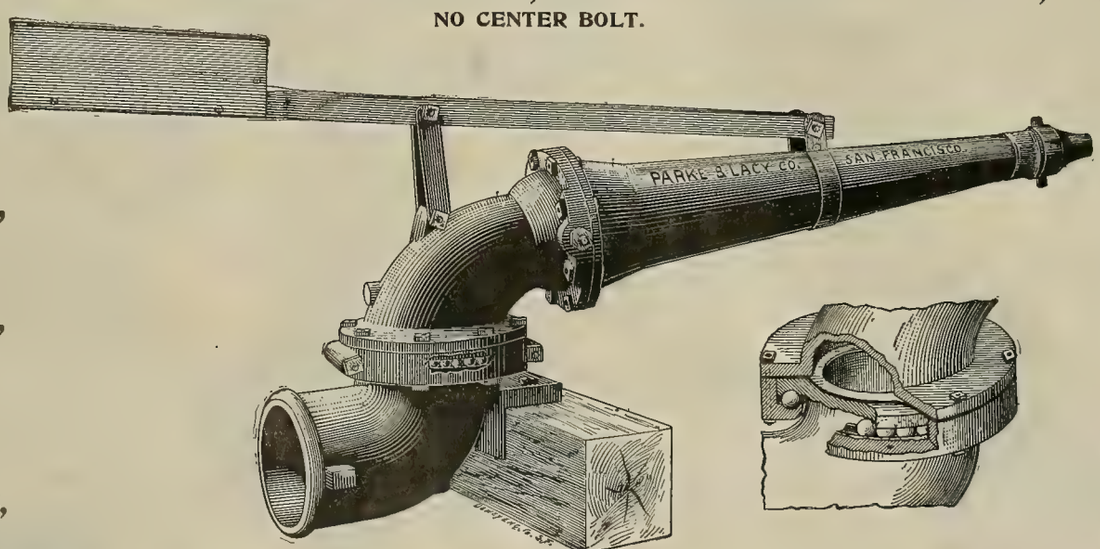
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No. 2066. — VOLUME LXXX. Number 6. SAN FRANCISCO, SATURDAY, FEBRUARY 10, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

An Idaho Silver-Lead Concentrator.

About one mile west of the town of Mullan, Shoshone Co., Idaho, is a silver-lead concentrator, depicted herewith. Shoshone county has in the past year been unpleasantly prominent in connection with destruction of mining property and long-continued labor troubles. It is here given prominence of a more pleasant kind in the possession of what is said to be the largest silver-lead concentrator in the world.

The main portion of the building covers a floor space of 92x165 feet, with conveyor house, crusher house and an ore bin of 1200 tons capacity. The machinery consists of a Blake crusher 9x15, two conveyors to two No. 4 Gates crushers, two 14-36 Allis crushing rolls, two 14-29 recrushing rolls, eight 3-compartment double jigs, eight 4-compartment double jigs, four sets 14-29 fine crushing rolls, four 5-foot Huntington mills, eight double-deck round tables, ten double-deck Wilfley tables, and six 6-foot Frue vanners with settling tanks. Power is supplied by two 6-foot Pelton wheels under 900 feet pressure, and one 20-inch Leffel wheel under a pressure of 40 feet, with an auxiliary steam plant consisting of two 100 H. P. boilers and a 16x42 Corliss engine for use in time of low water or accident to water line. The plant is heated by steam and lighted by electricity. The daily milling capacity is about 700 tons of crude ore, producing about seventy tons of concentrates, which assay 48% lead and fourteen ounces silver to the ton. William Nichola is mill superintendent, Thomas Cox resident manager.

The ore is a silver-lead product and is mined through a series of tunnels, aggregating 10,000 feet in length, which connect by tramway to a level of the railroad from the mill. The average assay of ore mined is 5% lead and one and a half ounces of silver to the ton, the low grade of ore necessitating handling and working in large quantity. At the new tunnel, No. 5, on a level of the railroad, is an air compressor and storage bin of 3000 tons capacity. The mine gives employment to about 250 men. Joseph Carson is superintendent of the mines. A railroad, two and three-fourths miles in length, with a 7% grade, equipped with a fifty-ton Shay locomotive and twenty-ton ore cars, connects the mine and concentrator. The mine has had a fluctuating history. Located in '84, after little development it sold for $25,000, opened up, and operated till the failure of its owners in '90, then bought by a Milwaukee concern who failed to make it profitable, leased in '94 with untoward success, again leased in '95, a new concentrator built which, destroyed by fire in '98, was replaced by the present one which has been in active and profitable operation since August 15th, '98, under the ownership and operation of Montana miners.

To the courtesy of Mr. P. L. Orcutt of the Mullan Mirror we are indebted for the use of the engraving.

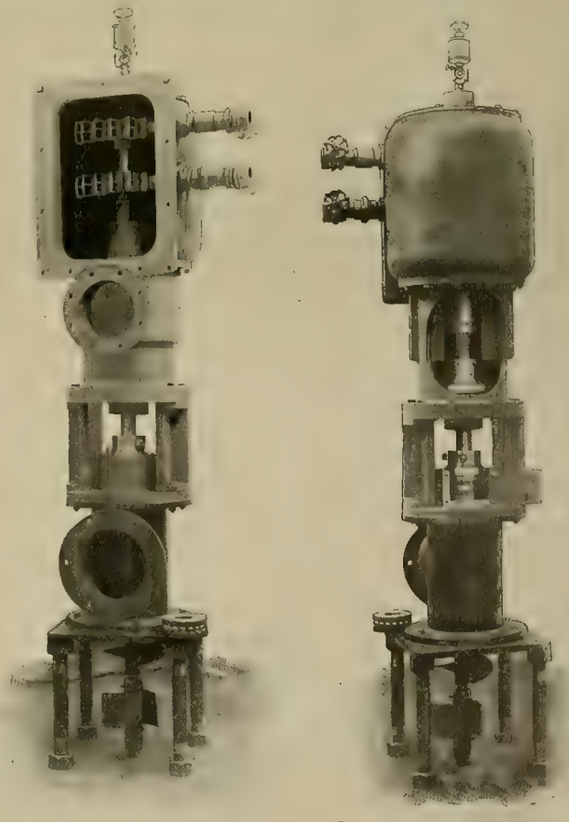


Concentrator Morning Mine and Mill, Mullan, Idaho.

A Propeller Mining Pump.

The accompanying illustrations show a Wood's No. 10 propeller pump direct connected to a Pelton water motor, lately installed on the 150-foot level of the Little Jamison mine, Johnsville, Plumas Co., Cal., of a capacity of 1800 gallons per minute, now pumping from a depth of 60 feet. Sinking will be continued in the shaft with the aid of this pump. In the cut on the left is shown the opened case which contains two 15-inch Pelton wheels on a 2½-inch turned steel shaft, which work under a head of 500 feet, developing 55 H. P. at a speed of 1500 revolutions per minute. The steel shaft runs in phosphor bronze bushings and is direct connected through a coupling to a double set of ball and disc bearings, which in turn is direct connected to the vertical shaft of the Wood's pump, extending 60 feet down the mine shaft in 10-inch oil well casing. Between the four uprights at the bottom of each picture may be seen one of the pump propellers and its guide, located at intervals of 5 feet along the shaft in the casing. The propellers revolve with the shaft; the guides engaging tightly against the casing hold the shaft in line and deliver the water from its whirling motion to a straight upshot and into the face of the propeller above. There is also shown one of the ball bearings. The greatest diameter of the pump head and motor is 20 inches; that of the discharge and pump casing is 10 inches. The entire weight of pump, motor, casing, shafting and discharge pipes is 4000 pounds. No priming is required, it being only necessary that the bottom propeller is in the water when the pump is started.

The propellers are located every 5 feet, and the same speed is used for the same amount of water through different heights. The manufacturer says it may be run slow enough to pump but a few gallons per minute; that the admission of air from top or bottom does not stop the pumping; an increase of speed will increase the rated capacity without the runners slipping or churning the water, and that sand and gravel may be pumped, with but a minimum of wear, without the pump becoming choked. The representative, L. G. Harrison, 31 Main street, San Francisco, Cal., has one of these pumps in practical operation at his establishment.



Propeller Mining Pump.

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J. F. HALLORAN.....Publisher.

San Francisco, February 10, 1900.

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Mine Values.

An essential difference between a mine and other kinds of property, from the investor's point of view, is that, in the minds of many, a mine, from the day the first dollar is realized from it to the day it is abandoned, is viewed as a constantly depreciating property. This is considering the legitimate investment, where it is expected to find profit between the yield and cost of production. Of course, in those instances (lamentably too frequent) where the primary intent is to direct the influence of the substantial qualities of a mine to the "boosting" of stock, it is of less importance to take into account the probable life of a mine. In such cases there is more money won and lost in a few months than, ordinarily, the mine ever produces.

Although the purchase of property other than mines may not prove a profitable investment, there is left, presumably, at the wind up, something to represent the original investment. This cannot be said of the mine which proves a failure for lack of ore. Unless it pays a margin of profit, it has absolutely no value and cannot be honestly transferred to other hands willing to undertake its operation in the hope that superior management or other means will make it pay.

It is often asked by the vendor of a mine why an investor requires a mine to yield results so far above the profits he would expect from other kinds of investment. The above is one of the reasons—the fact that a mine is viewed as a depreciating property and must return in money all that it has cost before it can be considered as an investment of original capital. That a large sum of money can be expended in the purchase or development of a mine, without possibility of recovering any fraction of it should the mine prove a failure, constitutes a risk which justifies proportional larger profits.

An investor buys land or loans money on land, and the land is always there for what it is worth. If he buys a mine and the mine does not return him his original capital, he has no resource. Consequently, the investor, when asked to pay cash for a mine, if he be cautious, will ask a reasonable assurance of a return of his money. Usually, capital employed in mining investments is willing to take its chance for profit on ground ahead, but it generally requires something to secure an original outlay.

The purchase of a prospect for a small sum is a different matter. In that case it is generally an investment on showings beyond which it is impossible to determine anything without spending money, and the risk or gamble is inseparable from it. But it should not involve the outlay of a large sum of money for the privilege of the risk, unless the conditions are exceptional.

Bullion at U. S. Mints and Assay Offices.

Mints of the United States now receive bullion of a much lower grade than ever before in the history of coin-making in this country. This not only permits of the sale of their product to the Government by a vastly greater number of mines, but the mints will take in more silver in alloy with the gold bullion than has ever before been permissible. According to the order of the Treasury Department, mints will take bullion 300 fine in gold hereafter. Ever since the establishment of the Denver Mint no bullion less than 500 fine was accepted. Most of the gold bullion offered to the mints is alloyed with silver in the greatest proportion. The acceptance of a lower grade of gold bullion, therefore, means the purchase of just that much more silver by the Government. Heretofore the quantity of silver in bullion was limited to 50%. Now there can be 70% of silver if there is 30% of gold. Officers in charge of the Denver Mint say the order will affect hundreds of mines in this section. The proportion of bullion running 30% in gold and the balance in other metals is vastly greater than that containing 50% of gold. Hence the Government gives those who have low-grade ore a chance. Under the old rule the officers in charge of the Denver Mint were compelled to refuse a great deal of bullion. In fact, there was more refused than accepted. This bullion went to the assayer, where almost any grade is accepted, but the man offering it pays a good fee for the refining of his metal. There will be but very little difference in the refining fee at the mint under the new rule, say the officers in charge.

The above is from a Denver, Colo., paper and is being widely quoted. From every quarter come questions to this office as to its correctness.

The subject is of sufficient importance to justify extended notice. The statement is misleading, as it implies, practically, the free coinage of silver without an Act of Congress to authorize it. The matter was referred to Mr. Chas. G. Yale, the statistician of the U. S. Mint at San Francisco, who shows that the mints and assay offices have always received bullion of 500 fine and over and have paid the depositor for his silver at the rate fixed by the authorities in Washington, which is at present 53 cents per ounce, and for the gold at its full value. They also receive and part bullion of 300 fine, but do not receive and purchase it. For the silver in these low-grade deposits the depositor is given fine silver bars for the amount of fine silver in his deposit, but the Government does not purchase the silver or give coin for it, as it does in the case of bullion of 500 fine. The only change made has been in the charges.

The item referred to was based probably on a misunderstanding of the recently revised charges for melting, refining, etc., at U. S. mints and assay offices as fixed by the director of the mint and approved by the Secretary of the Treasury last month. The rates under this new schedule show a large reduction in the charges, and it will naturally be a matter of interest to mining and mill men to know exactly what these are.

As to the melting charge, a charge of $1 is imposed for each melt of bullion except in the case of uncurrent U. S. coin and fine mint bars.

For parting and refining bullion the rate per ounce gross is as follows:

On silver bullion containing less than 300 thousandths of gold, three-fourths of one cent per ounce (heretofore this has been two cents per ounce); on bullion containing from 300 to 500 thousandths of gold, two cents per ounce; on bullion containing over 500 thousandths of gold, four cents per ounce. Silver allowed the depositor is calculated on the basis of refining the gold to 990 thousandths. When bullion contains less than three-tenths of a thousandth of gold it is not reported for the benefit of the depositor. Base bullion containing less than 300 parts of gold per thousand pays a charge of two or three cents per ounce, or such material may be declined, at the discretion of the chief officer. If the alloy be all good copper when but one of the precious metals is present, the charge may be one-half cent per ounce.

For refining silver the rate per ounce gross is as follows: A refining charge of three-tenths of a cent per ounce is imposed upon silver bullion free from gold, assaying from 998 to 998½, and a charge of four-tenths of a cent upon such bullion assaying from 980 to 997½. Bullion below 980 is subjected to the parting or refining charge of three-fourths of a cent per ounce.

The "toughening" charge is made to cover the cost of fitting brittle fine bars for coinage operations, and is not imposed upon unparted bars except in special cases, where it is necessary to toughen an unparted bar returned to the depositor, or when the bullion contains iridosmine, etc. This charge is on gold bullion ¼ cent to 2 cents per ounce gross and silver bullion ¼ cent to ½ cent per ounce gross.

The bar charges on bullion deposited for fine bars not required to be parted or refined, and for standard or unparted bars, are as follows:

Bars of fine gold per $100 value	$0.04	
Bars of fine silver per ounce	.00½	
Bars of standard gold per $100 value	.10	
Bars of standard silver per ounce gross	.00½	
Bars of unparted bullion per ounce gross	.00¼	
Small gold bars (less than $5000)	.05	per $100
Small silver bars (less than 125 ounces)	.00¼	per ounce

The "copper alloy" charge is 2 cents per ounce for the copper required.

Assessment of Mining Stock.

As in Colorado so in Utah regarding the assessment feature of mining companies, it is becoming generally recognized that the assessment plan, as in vogue in California, is an essential part of a working mine's make-up. It has long been a favorite with companies having stock for sale to be able to advertise "stock is non-assessable," conveying the idea that purchasers of stock have no further likelihood of expense, but for mines that are to be worked there is no better system of securing funds therefor devised than that of levying assessments when necessary. So that we note in the States mentioned and elsewhere a growing disposition toward the assessment plan. Of course where a mine owned by a corporation can be developed without levying assessments it is ever so much better, the same as in any other form of business; but, as in any other form of business, where money must be forthcoming to carry on the work there is no better financial method than to levy an assessment. Where no assessment can be levied, a mining corporation in need of money is in constant danger, is dependent upon the whim or fancy of a few recalcitrant or timid stockholders, and is never master of the situation. The objection to placing the power of assessment in the hands of the directors of a mining company is fear of misuse or abuse of that power.

Not infrequently assessments have been levied that were unnecessary, unjust, and savoring strongly of dishonesty. The knowledge of this abuse of power, trust and opportunity has made many fear that feature of the mining business. But in the mining business, as in any business, there must be trust and confidence somewhere, and an assumption of good faith; and because an exception is occasionally noted that should not work against the observance of so generally good a rule. After all, the personal equation, the honesty of the individual, underlies the whole thing: somebody must be trusted, no matter what the business, and that such trust is occasionally betrayed is more the misfortune of that particular company than the fault of so salutary a rule.

We look to see a general growth in the belief that the assessment system affords, ordinarily, a safe and certain plan for the provision of funds to carry on the development of a mine and its preservation from debt or vexatious relinquishment.

In the last three issues appear detailed accounts from one of our special representatives of what is being done in gold quartz mining in one of California's thirty-seven mining counties. Tuolumne is a good average example of a California gold mining county. It has furnished to the world $211,000,000 gold, and s but surface scratched. The same may be said of several other counties of California, commonwealths in themselves, that have yielded great store of gold, and which by deep mining will add still greater amount to the gold output. California has produced gold so much and for so long a time that it would naturally seem to the world that so great a gold-yielding area should show signs of exhaustion. What California has for fifty years under, sometime, crude conditions turned out is but a small part of what remains.

It has been asserted with some show of truth that the U. S. Geological Survey was and is opposed to the movement looking to the creation of a Cabinet Department and a Secretary of Mines and Mining. Without assuming to speak for that branch of the public service, this paper is able to say that the Geological Survey is in hearty accord with the movement and favors the furtherance of the mineral industry which would result from the creation of such an executive branch.

Concentrates.

ONE is not entitled to rescission of a contract who is unwilling to perform his part of the agreement.

MARINE steam engineers only are required to have a license. The Federal Government has supervision over them.

THE longest telegraph line in the world is believed to be the one between Derby and Cape York, Australia, 7246 miles.

MOMENTUM is the weight of a body multiplied by its velocity, usually in feet per second, and denominated in foot pounds.

WITH 100 feet head and 50 inches water there should be 12 H. P. In California a miners' inch is about 1½ cubic feet per minute.

ON April 17th, '95, the London price of silver was 30⅛d (925 fine); New York, 67½ cents (1000 fine); commercial value in $1, .522 cents.

THE borrowing of money which the borrower knows does not belong to the lender is conversion, for which both are liable to the real owner.

A BAR of round steel, 6 inches diameter, 12 feet long, would weigh 1156.32 pounds. A similar bar 3 inches diameter would weigh 289.44 pounds.

A CUPEL, whether old or new, will not be likely to spurt if heated up first and then the muffle opened for a few moments so that organic matter roasts off.

A WIND velocity of forty miles an hour occasions a pressure on a vertical surface of 6.65 pounds per square foot; of fifty miles per hour, 10.06 pounds per square foot.

A WELDING STEEL mixture, recommended, is 1 part sal-ammoniac, 10 parts borax, pounded together, fused till clear, then poured out, and, when cool, reduced to powder.

THE estimation of sulphides and cyanates in commercial cyanide, the determination of the purity or value of cyanide of potassium, is a matter for a competent analyst.

A RAILROAD receiving freight destined to a point beyond its own line is only bound, in the absence of a special contract, to safely carry on its own route and deliver it to the next connecting carrier.

AN 850-pound stamp dropping ninety-five per minute needs 1¼ H. P.—for each stamp in the battery. Water needed for each stamp per hour averages seventy gallons; for an ordinary concentrator about 250 gallons.

AS BETWEEN flat and round hoisting ropes, each has its adherents; with a flat rope a smaller engine can be used. Michigan, Pennsylvania and Colorado favor round rope; Montana, California, Utah and Nevada favor the flat.

A MINE FAN works harder when drawing in fresh surface air from the atmosphere, and, therefore, makes fewer revolutions in a given period than when it draws in the thinner and warmer air from underground workings.

A MANILA ROPE, 3-inch circumference, .955-inch diameter, weighs .297 pounds per foot, has a breaking strain of 6115 pounds, and is safe for a 611-pound load if used for hoisting. One wire rope will outlast three hemp ropes.

THE breaking strain of a plow-steel wire rope 1¼ inches diameter, made of six strands of nineteen wires each, and hemp center, is 150,000 pounds, according to John A. Roebling's Sons' Co.; of 2¼ inches diameter, 480,000 pounds.

TO CONSTITUTE a vein it is not necessary that there be a clean fissure, filled with mineral, as it may exist when filled in places with other matter, but the fissures must have form, and be well defined with hanging and foot walls.

IN almost any situation in life a man's safety depends, primarily, upon himself. In mine work the safety of himself and everybody connected with him depends largely upon his care, intelligence and constant exercise of common sense.

NO ONE outside the incurable ward of an insane asylum should give a moment's serious consideration to a "divining rod" or "dousing stick" or similar device in the hands of any one purporting ability to indicate the presence of mineral in the ground.

A GOOD steam boiler cement for cracks, and to secure joints, is made of litharge 2 parts, very fine sand and quicklime (slacked spontaneously in a damp place) 1 part each, to be mixed and kept from the air; to be made in a paste with clear boiled oil when used.

GILPIN CO., COLO., gold ore not uncommonly carries 15% pyrites; California ore rarely carries more than 3%, hence the difference in the rapid coarse crushing of the latter with a heavy quick-drop stamp, and the slow fine crushing of the former with a light slow-dropping stamp. The Colorado process primarily places amalgamation more prominent.

IN adding bromine to a solution of cyanide of potassium, should too much bromine be added, a solution containing cyanogen bromide, potassium bromide, and possibly free bromine, will be obtained. It is required to have potassium cyanide or other metallic cyanide, as such, present, together with the cyanogen bromide. The dark-colored products resulting from the treatment of cyanide solutions with bromine occur in strong solutions, but are practically absent from solutions of the dilute standard employed in practise—say, of 0.3% potassium cyanide, downward.

AT the Baliol G. M. Co.'s mill, Sutter Creek, Amador Co., Cal., forty 850-pound stamps have crushed 5885 tons ore in 27½ days—a daily average of 5.35 tons per stamp per day. Seven and a half tons to the stamp per day is the best California record known to "Concentrates," and was made by G. McM. Ross.

IN two pole dynamos the proportions of ring armatures vary from a length equal to one-half the diameter to a length equal to one and one-half diameters. It is common to make the length equal to the diameter. For drum armatures the length sometimes equals one and one-half diameters and sometimes three diameters. It is common to find the length equal to two diameters.

PROBABLY the best assaying manuals for prospectors, miners and assayers are Aaron's Assaying, Part I, and Parts II and III. The first is a volume sold for $1; the Parts II and III constitute a second volume, sold for $1.50. New editions, rewritten and up-to-date, have recently been issued by the book department of this paper and the books will be sent postpaid anywhere.

ONE INCH OF RAIN falling upon an area of one square mile is equivalent to 17,500,000 gallons — 145,200,000 pounds. If falling from clouds 3000 feet above the earth, this represents an energy of 22,000 H. P. Pumping machinery at 2 pounds of coal per H. P. per hour would require 200 tons coal to raise the water represented by 1 inch of rain on a square mile to a height of 3000 feet.

NON-RESIDENT creditors of a corporation in the hands of a receiver, if they are not residents of the State in which he is appointed, are held to have the same right that domestic creditors have to contest the receiver's title to property, and are not estopped from pursuing attachments in other States, by filing a claim with the receiver, where they expressly reserve their rights under the attachments.

ASSUMING the truth of the assertion that caves in old and abandoned mines occur more frequently at midnight than at any other time, and that there is an increased flow of water at night, occasioning it necessary to run a pump somewhat faster, the theory as to the cause might be that both those effects were caused by the position of the sun on the other side of the globe, thus increasing to a slight degree the force of gravity.

THINK over something you've done in mine work, something that you think was well done, a profitable experience, and, with the thought "my light is none the less for having lighted my neighbor's," send the editor of this paper an account of it. Describe it as though you were telling a fellow-miner about it; if convenient send a sketch of it. No one cares particularly for style or "fine writing." What is wanted are the facts.

MINE WATER is ordinarily objectionable for feeding boilers because it is likely to contain acids and sulphates destructive in their action. Sulphate of lime forms, occasioning scale; corrosion or pitting below the water line is primarily caused by the action of a free acid. The reagent for ammonium sulphide is, approximately, bicarbonate of soda. Sulphate of copper will produce complete reaction, forming sulphate of ammonium and sulphide of copper.

"CONCENTRATES" can not give a regular, exact or uniform statement as to the increase of temperature with depth. Conditions vary. On the Comstock, in Nevada, is found one extreme; in the Calumet & Hecla, Lake Superior region, is the other extreme. In the latter, at a depth of over a mile, the temperature is sometimes lower than on the surface. The subject has been given great research. In English and Belgian mines the average increase is about 1° F. for every 50 feet.

"PORPHYRY" is a handy and convenient name for a rock of which one does not know much. It is easy, and, generally, safe, to call it "porphyry," and let it go at that. Petrography is not as yet an exact science, and the precise shades and fine distinctions of difference between different "rocks" approximately of the same "species" are not of overshadowing importance. Any recent elementary work on mineralogy will give as much information on this subject as one can assimilate or find necessary.

J. M. WHITELOCK, of Boulder, Colo., who is afflicted with heart trouble, can take a little pronged stick and point out the man who has the most metal money in his pocket, tell just where the pocket is, and whether the money therein is copper, silver or gold. He can also trace hidden ore veins in all their dips, spurs, angles and sinuosities, and is locating claims for miners. He is bothered most to death by men who want claims located, and has organized a company with a capital stock of $300,000. So J. M. W. says.

TO FIND the horse power of a common slide valve engine: Multiply the square of the diameter of the cylinder in inches by 0.7854, and this product by the mean engine pressure, and the last product by the piston travel in feet per minute. Divide the last product by 33,000 for the indicated horse power. In the absence of logarithmic formulæ or expansion table, multiply the boiler pressure for ⅝ cut-off by 0.91, for ½ cut-off by 0.85, ⅜ cut-off by 0.75, ¼ cut-off by 0.68. This will give the mean engine pressure per square inch near enough for ordinary practise, for steam pressures between 60 and 100 pound, always remembering that the piston travel is twice the stroke multiplied by the number of revolutions per minute.

THE limits of electrolysis are deducible from the assumption that the chemical energy which disappears in a cell reappears entirely in the form of electrical energy. Knowing the heats of formation, and the solution of the various substances which can take place in an electrochemical reaction, one can calculate the resulting E. M. F., and, conversely, it is assumed in any electrolytic process the electrical energy which disappears in the electrolytic cell reappears entirely in the form of energy of chemical separation.

IN the process asked about by H. T. L., Loomis, Wash., a solution of bromide of potassium is electrolyzed and thus is produced an ankaline solution which contains hypobromide and bromate, which is capable of dissolving gold. The crushed ore is treated with an excess of this solution by rotating cylinders. The solution is then filtered, the gold precipitated by passing over a mixture of iron and coal, and the solution, which now contains bromide of potassium mainly, is once more electrolyzed, and again used for extraction.

FOR a shaft 900 feet deep, the cage and load weighing four tons, the requisite size of the steel wire rope can be determined by the following formula: Assuming a rope 1 inch in diameter, such rope 900 feet in length would weigh 1350 pounds. A steel rope 1 inch in diameter has a safety strain for hoisting of four tons, and the safety strain for rope and load would be 8000 — 1350 or 6550 lbs. The stated load without the rope is 8000, so that the square root of 8000 ÷ 6650 or 1.1 would be the diameter of the required rope in inches.

THOS. A. EDISON says that why 110 volts became the standard for lighting circuits came about in this way: In his primary work in electric lighting he always allowed 10% for errors, leakage, etc., and when one of his assistants suggested that 100 volts be made the standard, Mr. E. said, "Just add 10% as usual, and make it 110 volts," which set the standard at that arbitrary figure. The extended use of the three-wire system, which gave 220 voltage between the positive and negative wires, made the last named figure the standard for the early motor work.

A MAN can breathe and exist best at the normal atmospheric pressure of 30 inches of mercury, equal to 14.72 pounds per square inch. He can barely exist at a height of seven miles, where the pressure is only one-quarter of that at the surface of the earth. A man can breathe and work for some hours under a pressure of 2½ atmospheres, or 37½ pounds per square inch, as in a diving bell, but under a greater pressure paralysis may be produced. Work was done at the St. Louis, Mo., bridge by men under a pressure of over four atmospheres—63.7 pounds per square inch.

'TIS TRUE that "fools rush in where angels fear to tread," but occasionally one emerges a little higher than the angels. Ofttimes the "foolish" experimenter of today is the famous (because successful) scientist of to-morrow. Without experiment there is no advance; without discontent with old or present methods, no progress; without original research, no lasting good. The electric light, the cyanide process, the 5000-foot deep shaft, were all "theories," "experiments." Being accomplished facts they are applauded, copied, used. Let us not be too hasty in criticising the experimenter and theorist.

IF a mine were making 50 cubic feet water per minute, and had a sump that would hold twenty-four hours accumulation, and a pump that would raise it in fifteen hours, the supply being cut off, it would take the pump forty hours to empty the sump if the water were allowed to continue running into it at the rate stated. The sump holds 72,000 cubic feet water. If the pump drains it in fifteen hours its capacity is 80 cubic feet per minute. If 80 cubic feet is pumped out every minute and 50 runs in, if the water is allowed to continue running in, the pump would take 72,000÷30, or 2400 minutes, or forty hours to unwater the sump.

THE smelting trust organized last spring owns twenty-three plants, nine of which are in Colorado. No Pacific coast smelter is in the combine, declining any overtures thereto. The trust has outstanding $27,400,000 each common and preferred stock. The output since the consolidation has been curtailed by strike of employes. The nine Colorado plants have a daily capacity of about 5500 tons of ore and they employ 4500 men. The smelters' trust is said to pay in wages more than any other single industry in Colorado, not excepting the railroads. The business is at present profitable. Public opinion in Colorado and Utah is against the policy, and competition in the former State is inevitable.

A WIRE ROPE is just like any other machine: it needs care and lubrication. The latter is important; as a lubricant it needs to penetrate all the wires, as a preservative it must be free from acids and must prevent rust, as a protection it should turn liquids and obviate abrasion. Linseed oil is not a good lasting lubricant; a better article is made of tar, summer oil and mica axle grease in varying proportions to suit varying conditions. The tar and oil must be free from acid. Well made, this compound penetrates the wires, prevents rust, and fills the cable, shedding water, keeping the core in good condition and adding 25% to the rope's life. The best way of applying this lubricant is by a small, steady drip, very slowly pouring in a fine stream while the rope is in use.

The Occurrence of Gold.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS, California State Mine Examiner.

In the earlier history of mining the impression generally prevailed that gold only existed in defined veins, that is, in a vein-like sheet of rock readily distinguishable from the country rock which it traversed. Quartz veins are usually so distinctly different from the rocks in which they occur as to be readily recognized by a novice. The first impression that the new prospector forms when he starts out to find a mine is that gold must exist in some particular kind of rock and he inquires what that rock is and is told quartz. He then is shown a piece of white quartz and he considers that portion of his education complete—"gold is found in quartz and quartz is a hard white rock." This becomes firmly fixed in his mind and with this preconceived notion of the environment of gold in veins he starts out, but he does not proceed far before he becomes confused by finding gold in other rocks. One by one he adds to his store of mining knowledge the varied occurrences of gold and he learns that it is found in lime, in sandstone, in granite, in greenstone, in porphyry, in flint, and in every kind of rock of which he has any knowledge.

It soon becomes evident to him that if he is to attain success he must cast aside prejudice for or against any particular formation or rock, and seek gold wherever it may be found. The most perplexing things are met sometimes but each new and strange occurrence presented adds to his knowledge and his chances of success become greater in consequence.

Gold is not wholly confined to veins which are sharply defined but it is also found in massive rocks where the evidence of vein formation is not pronounced—at least, not sufficiently so to be recognized by the inexperienced prospector, though when gold-bearing deposits of this character are worked systematically they are found to have more or less definite limits though these may be very irregular, and in some instances the walls are determined by the economic results of mining operations.

Invariably, gold when found in massive rocks occurs in a zone which has suffered more or less fracture movement and alteration, which may extend over a considerable area, so large, in fact, as to destroy its semblance to a vein. The gold-bearing deposits at Hedges, in San Diego county, Cal., are really large impregnated zones of hornblende schist, very siliceous and varying much in color, being gray, green or bluish, the color being determined by the contained minerals, such as hornblende, chlorite, epidote, etc., but the gold-bearing rock is rarely white. The zones of pay ore are irregular and appear to have been influenced by the extent to which the solutions which deposited the gold and silica have been able to penetrate the rocks from the fissures through which they came from below.

In the Black Hawk mountains of San Bernardino county, Cal., is a large stratum of limestone, which by a series of step faults, thrusts and transverse fractures has been displaced and is now found lying on the mountain side in a series of terraces. The rock has been much fractured by the movements, which must have been violent, and some zones of this rock are crushed into a granular mass. It is stained to a greater or less extent with iron oxide (hematite), which usually occurs as a dust-like coating on the fractured faces of the rock, though sometimes massive as an ore. A great part of this limestone formation is gold-bearing, some portions being much richer than others and there are also small segregated bunches of high-grade ore.

A few miles distant to the eastward the heavy-bedded quartzite of the Gold Mountain mines, in the same range, are gold-bearing to the extent of being pay rock, and some of this rock also is rich. The quartzites, like the limestones, have been crushed by the dynamic forces which are such a pronounced feature of this range of mountains.

In the several counties of the gold belt of California gold occurs in broad zones of amphibolite schist (chloritic and talcose) with little quartz in many instances. Some of these deposits are of great width and should be designated zones rather than veins. The Blue Gouge mine of El Dorado county, Cal., is a zone of slaty rock more than 600 feet wide, in which occurs at intervals small veins of quartz. All of this zone is gold-bearing but low grade.

The great Alaska-Treadwell mine, on Douglas island, Alaska, is a large mass of altered eruptive material largely feldspathic. It is gold-bearing across a zone several hundred feet in width.

In Cripple Creek district, Colorado, the andesite-breccia and granite are each gold-bearing and frequently possess few of the characteristics which distinguish defined veins. The amount of silica in these rocks in some cases is so small that the veins have no outcrops, or at least are not prominent as veins. Cripple Creek is not exceptional in this respect, as similar conditions are found elsewhere.

The ore body of the Homestake mine, at Lead City, South Dakota, on the 800-foot level is over 450 feet in with. It is a hydro-mica schist including numerous veins and lenses of quartz, large and small. If a single one of these quartz veins were to be worked independently there are few of them that would pay, but the great mass when mined as a whole is worked at a profit and has produced many millions of dollars, and will continue to be profitably worked for years to come.

The granites of California in many places are gold-bearing, but this only occurs in proximity to a fissure or vein, so far as observed.

One notable instance of the occurrence of gold came to the notice of the writer some years ago in Calaveras county, California, several miles northeast of Murphys. At the place referred to is an ancient river known as the Fort Mountain channel. It is capped to the depth of several hundred feet by a series of deposits of tufa, volcanic mud, gravel derived from volcanic detritus, and at the top a heavy deposit of breccia. All of the volcanic rock is of andesitic type. It ranges in color from ashy white to nearly black, and in texture from fine sand or mud to coarse fragmental material (hornblende andesite) in a fine-grained tufa. A number of samples of this material were taken and assayed in San Francisco, Cal., each sample showing the presence of gold from a trace to about $3 per ton, and of silver from one ounce to four ounces per ton. The occurrence of the gold might have been attributed to a fragmental origin similar to the placer gold occurring in heavy river gravels in the gold regions of any country, but this theory would not satisfactorily account for the presence of the silver, and the conclusion reached was that this fragmental volcanic rock was really gold-bearing, though to a very limited extent. The assays were not checked but were deemed reliable.

In Colusa county, Cal., some unusual deposits of gold were noted in connection with what has the appearance of siliceous sinter. The occurrence is limited, and the deposit has not been traced to its origin. It will be observed that gold deposits are not confined to white quartz veins, or, in fact, to quartz at all, though more frequently associated with silica in some form than with any other mineral except iron.

Besides the occurrences of gold above noted, it is found in many other rocks, both massive and sedimentary—the latter generally metamorphic. Igneous rocks are commonly gold-bearing, though always in connection with zones of fracture and often of shearing. Dykes are not infrequently gold-bearing to a notable extent, the gold-bearing portions presenting no material difference from the parts which contain no gold. Dyke rocks which contain gold are not always fissured or crushed, being of comparatively limited extent. In such cases the gold-bearing solutions undoubtedly ascended along the plane of the fissures bounding the extent of the dyke—its walls, as it were. Where gold occurs in dyke rocks it is usually found in shoots, in the same manner as shoots of pay rock occur in a vein. In some dykes the pay rock is confined to the vicinity of the walls and in others it is segregated to certain veins or crevices, crossing the dyke from wall to wall and dividing it into a series of floors.

The prospector must pay attention to every sign and to many places where the well known indications are wholly absent, for, failing to do this, he may pass by a deposit of untold value, leaving it for some more observing or fortunate follower.

Outcrops—Croppings.

Written for the MINING AND SCIENTIFIC PRESS by J. P. WALLACE.

That portion of a vein which appears on the surface is called the outcrop or cropping, and the course of such cropping is known as the line of outcrop. The line of outcrop and the strike correspond exactly when the vein is vertical or when the surface of the country is horizontal. With any other inclination than the vertical, outcrops will necessarily vary in position with the irregularities of surface; the lower the angle of dip the more winding will be the course of outcrop, especially where the strike of the vein is crosswise to the gulches and ridges. In locating a claim no attempt should be made to follow the irregular course of the croppings, but it is important that all croppings be well within the boundary lines. Thorough prospecting, therefore, for the line of outcrop should be made. When this is determined, the strike of the vein is made known by extending the line horizontally—on the level—at right angles to the average dip of the vein.

Croppings differ much in appearance and character. Some are very prominent and rise to a height of many feet above the ground, while others are comparatively insignificant. Hard massive quartz, or some of the but slightly mineralized metamorphic rocks, commonly make up the most conspicuous outcrops. Rocks containing a large percentage of metallic minerals decompose and wear away more readily than others. Quartz which is impregnated with iron, copper or lead sulphides is often much honeycombed and disintegrated and seldom furnishes prominent outcrops. Ribbon quartz and banded rocks, because of their loose character, and, therefore, greater susceptibility to atmospheric influences, crumble more rapidly than massive quartz. Lodes containing much fluorspar, calcspar or feldspar decompose easily.

Surface waters, by their oxidizing and dissolving powers, often so completely change the original texture of outcrop zones as to render the identification very difficult. The oxidizing effect of the atmosphere, coupled with that of heavy winds and pelting rains, also materially aid in the surface changes of ore deposits. Certain metallic constituents in an ore are dissolved out and carried through underground channels to the surface, or else allowed to sink to lower levels in the vein where they may be deposited in a more concentrated form; other minerals are reduced to oxides, chlorides and carbonates, and these, together with the unoxidizable and not easily soluble minerals, such as gold and platinum, remain in the porous and honeycombed vein filling. Chemical processes of this kind are called "weathering." The zone of oxidation usually extends in depth to the drainage level of the district. This varies in different districts and in different lodes in the same district; water level is found beyond the influence of alteration.

Lodes seldom outcrop their entire length; usually they protrude only at intervals along the strike and occasionally in but one place. This lack of surface continuity determines nothing as to the horizontal extension of ore bodies in depth. Outcrops vary in width from 1 inch or less to 100, 200 or 300 feet.

Croppings are often very misleading in appearance; the least attractive ones sometimes prove to be the most remunerative. Yellow mud, reddish clays, brownish, blackish, whitish or rusty dirt—all seemingly barren—occasionally astonish the prospector with their high metallic contents. It is generally impossible to estimate with any degree of accuracy the value of such decomposed products without an assay, and this should always be had. Even if low in grade where examined, the present condition makes it probable that a higher degree of mineralization and concentration exist elsewhere in the same deposit and calls for further exploration. Many prospectors rely exclusively upon panning and amalgamation for the determination of gold values, but these are not always trustworthy. In not a few cases clay and talc outcrops show no colors by the most careful panning and yet yield good results by assay. Oxidized iron croppings, rich in gold, sometimes refuse to give up their values to amalgamation, and gold in a finely divided condition is not always saved in the pan.

Alteration of metallic minerals in vein croppings may be partial or complete. When only partially oxidized, these minerals will be found either bunched or scattered in the deposit and are indication of the character of ore likely to be encountered in depth. Gold-bearing surface ores which have undergone considerable alteration are generally higher in grade than the same ores prior to oxidation. Undecomposed gold-bearing surface ores, as a rule, are neither richer nor poorer than the same ones in depth. Oxidation, therefore, is enriching in its tendency. These are well established truths, but they are often very difficult ones for the average prospector and miner to learn.

Surface decomposition in a gold-bearing pyritous ore produces a reddish or brownish oxide cropping, more or less intermingled with fragments of quartz and earthy matter. This is commonly known as the vein capping, gossan or iron hat, and varies in thickness from a few to many feet. Veins of this character are sometimes so extensively decayed that they have in places crumbled to fragments, and the accumulated remains which hide from view the real lode are often so rich in free gold as to be worked with great profit by sluicing, same as placer gravel. Nearly all prominent gold mining camps have furnished examples of this kind. Decomposed croppings are generally wider than the veins they cover.

Galena decomposes to lead sulphate and this in turn to lead carbonate. Croppings of the latter present a white, gray or brownish appearance, but not infrequently they are colored reddish or yellowish from admixture with iron oxides and other minerals.

Quartz carrying decomposed ruby silver is commonly stained a light to dark red color, but when combined with other metallic minerals the color varies.

Weathered zinc ore deposits are commonly indicated by a soft, whitish clay-like outcrop, which contains the zinc in the form of carbonate or silicate. Both are oxidation products from zinc sulphide. The color varies sometimes from greenish to brownish.

Cinnabar ores usually furnish an ocherous-like cropping, resembling reddish oxidized iron ores or red clays, and are often associated with a brownish or black opal and more or less quartz and lime carbonate.

A black, brown or gray cropping is common to many ores. Most of the copper deposits have had a dark brown or blackish outcrop, although a dark red or light brown is not wanting. The blue and green copper carbonates occasionally appear as croppings, and in some instances mark the site of valuable deposits; but, as a rule, a very small amount of these stains a very large rock surface, and, therefore, is often misleading as to the amount of copper present.

The croppings of graphite, chromite, the manganese oxides, manganiferous iron ore and antimony sul-

phide have a black, iron-black or dark steel-gray color.

The hematites, magnetites and iron carbonates vary in color at the surface from brown to reddish and from black to blackish-brown.

Both brittle silver and silver glance, when decomposed, constitute the so-called "black sulphurets" of miners. Surface quartz containing these rich silver ores is often much blackened and honeycombed, and not infrequently black lumps or nuggets of silver occur in the croppings.

Antimonial silver, antimonial sulphide of silver and seleniuret of silver all show more or less blackish croppings.

Horn silver is a secondary product, occurring usually at or near the surface in thin crusts, which are spread over the surfaces of the gangue rock and in minute seams through it, but often in irregular lumps, filling cavities in the gangue. It resembles wax or putty, and is colored greenish, yellowish or brownish, but often is many colored and of an earthy appearance when much decomposed. To one unfamiliar with this ore it appears to be of no value.

Some lodes do not outcrop and these are said to be "blind." In such cases the vein fissure terminates before reaching the surface, or, if it did once outcrop, the back of the lode is now covered up by later formed strata, lava flows, wash or slide rocks. Blind lodes occur in all mining camps and are generally discovered accidentally during the prosecution of work in adjoining properties. Often a hint of their presence is given through broken quartz or other mineralized gangue rock found intermingled with the soil. When decomposition is rapid the back of a lode is often worn down and washed away by heavy rains to such an extent as to form a depression or trough, which marks the course of the vein, and this trough in time becomes partially filled in from the sides with debris and sometimes grown over with grass or brush. In other cases the trough becomes the track of a stream, and the stream eventually cuts out a canyon, with the wall rocks bounding it and the vein on either side. The back of the lode will then be in the bed of the stream.

Blind veins may be looked for along the line of displacements (faults) and in association with dykes; in both cases the lode is apt to be covered either by disintegrated dyke material or by loose rock, soil and rubbish of various kinds.

Sumpter, Or., Jan. 26.

Of Interest to Owners of Refractory Ore.

Written for the MINING AND SCIENTIFIC PRESS by S. E. BRETHERTON, Manager Silver City, N. M., Reduction Co.

Several years ago the writer, while in charge of a large lead smelting plant in Leadville, Colo., experimented with the waste heat of slag while it was still in a liquid or fluid state, for the purpose of producing steam, and was surprised at the success he met with, even with the crude arrangement he had in use for making the experiment. He then tried to secure patents for this purpose, but the application was rejected each time on the grounds that he conflicted in some way with other patents, so he let the matter drop. About this time hot blast was being experimented with for smelting sulphide ore, and I was at once favorably impressed with the idea, as it was in line with the great advancement made in iron smelting by the use of hot blast, although the extensive methods adopted by the iron ore smelters are not practicable or necessary in either lead or copper smelting.

The Bimetallic Smelting Co. in Leadville adopted the use of hot blast after Lawrence Austin had demonstrated to them that it could be successfully used—in fact, Mr. Austin deserves the credit of spending much of his time and knowledge in the development of the hot blast idea for the smelting of sulphide ore without the usual expense of fine crushing and roasting. The blast was heated by passing it through return bends of pipe set in a brick furnace heated with wood or coal.

I at once saw that the idea on utilizing the waste heat of slag for steam could be applied to heating blast, and we were granted our first patents for that purpose. This scheme not only saves the expense of fuel for heating the blast, but gives a much more steady heat and is arranged so there is no back pressure on the blowers, which is caused by return bends.

As one improvement leads to another, we then had our slag receiver enclosed and set on jackscrews with wheels, more on the principle of an ordinary large cupeling furnace for concentration lead bullion than a reverberatory roasting furnace.

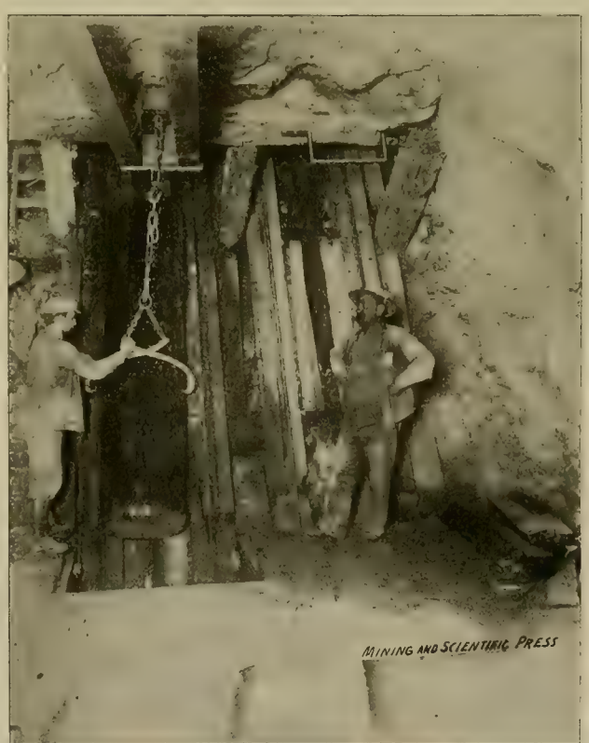
This style of furnace enabled us to keep the surface of our slag liquid with very little fuel on top, and also use a slag receiver or matte settler, without chilling, several times larger than when not enclosed. Now, when using a deep settler and making very high grade copper matte there is danger of chilling it in the bottom of the settler; this trouble we obviated by passing the balance of the white heat, after it had been utilized for heating the blast, back under the settler and then to the chimney. Should the settler get too hot at either side, an opening is made in the wall so as to allow a cold draft to chill that portion of the settler. A long, deep spout kept full of liquid slag so as to trap the blast connects the blast furnace with the slag receiving furnace, which keeps up a continuous flow of slag and does away with tapping the furnace. This steady flow of slag gives it a much better chance to free itself from matte than an intermittent rush, which is caused by tapping by hand in the usual way, from small furnaces.

Our arrangement and experience here has enabled us to use the same settler for months while making an average of 60% copper matte and making a slag unusually clean. As simple and cheap as this arrangement may seem (costing about one-fourth to one-tenth the price of a roasting furnace), it does away with roasting entirely and utilizes the sulphur as fuel in the blast furnace, at the same time combining in the arrangement an improved method of cleaning the slag. It has been in successful and continuous operation for one year at Silver City, N. M., costing very little for repairs and reverses, the general order of smelting making sulphide ore now more desirable than oxidized ore, not only of requiring less fuel, but a much higher percentage of the values are saved and the smelting capacity of the furnace increased. There are three patents to protect the owners, but the right to use all three can be secured on reasonable terms.

It is optional with the parties using the arrangement whether they have the blast pass directly from the blower into the heating box on its way to the blast furnace or pass it en route through an air jacket above the feed floor around the smokestack. This air jacket warms the blast and keeps the feed floor cool.



Handling Timbers—1600-Foot Level Rawhide Mine, Tuolumne County, Cal.



Handling Timbers—1700-Foot Level Rawhide Mine, Tuolumne County, Cal.

Method of Handling Timbers.

Written for the MINING AND SCIENTIFIC PRESS.

A system of handling timbers at the Rawhide mine, Tuolumne county, Cal., has labor-saving features deemed worthy of illustration and description. The method was devised and put in practise by Chas. Jacobs, the mine foreman, whose practical intelligence has been of service to his company. The accompanying illustrations, taken at two underground stations, show the principal parts of the device. It will be seen that a heavy timber has been let down the shaft or incline, attached to the bottom part of the skip. It is fastened thereto by a specially constructed chain, fitted at the end with dogs, which are driven into the timber, as is done at logging camps. When the timber arrives at a station in the mine where it is to be unloaded, a workman seizes it with a pair of strong clamps, similar to an iceman's tongs, the chain fastening the timber to the skip is then unhooked, and the timber is run free of the skip and away from the shaft by means of a trolley track fastened to the roof of the station. Being thus suspended by a chain 4 or 5 feet long, the single workman who fastened the hooks into the timber can easily swing the log upon a truck, and it is then ready to be wheeled into the drift where needed. This is the process in case of heavy timbers, where the skip is obliged to stop at the station. In case of small timbers, which are sent down inside the skip, a practised workman can fasten the hooks into the timber while it is in motion and draw it out without checking the descent of the skip. Not only are heavy timbers sent down the mine in the method first described, but a number of smaller poles can be fastened together by chains and the entire bundle handled in a manner similar to that adopted with large timbers. An essential part of Mr. Jacobs' device is the trolley fastened to the roof of the station. This is similar to the trolley that is frequently built over large saw-tables. Another feature is the construction of the hook by which the chain is fastened to the skip. It is a pointed affair, the two parts of which fold up to each other and are held in place by a ring, which slips down and clamps them together. The ring is easily slipped up and the two parts unfold, thus releasing the chain. But one man is necessary at a station to handle the heaviest timbers, instead of three or four men, as in some mines. The labor-saving element of this device is apparent here, as well as in the time-saving that is effected. The whole invention is simple, but of such practical advantage that it is deemed worthy the attention of all mine foremen who are on the lookout for improvements.

Tunneling Record at DeLamar, Idaho.

Written for the MINING AND SCIENTIFIC PRESS by D. B. HUNTLEY, Manager at the Mines.

As the result of a friendly wager between rival mining companies in this county a tunnel lately run at DeLamar, Owyhee county, Idaho, by the DeLamar Mining Co., Ltd., made an excellent record. The conditions and costs are given below:

An old, small tunnel had formerly been driven 160 feet. Work was re-commenced upon it July 5th, '99, and by September 1st, '99, without any rushing, it had been straightened, enlarged, grade taken up, and driven to a total length of 250 feet. Then work under the wager commenced. During the preceding two months a Rand steam-driven 14x22-inch cylinder class C compressor, and a 14-inch Buffalo exhaust fan had been placed, air and water pipe, track rail, cars, drills, etc., secured. The compressor was situated in the mill building about 500 feet from the mouth of the tunnel. Thus, on September 1st, all was ready for work, which was pushed with the utmost vigor until January 1st, 1900. There were only two days lost time (September 4th, which was Labor Day, and Christmas), making the total time of operation 120 days. The monthly progress was as follows: September, 279 feet; October, 389 feet, and 6 feet in a powder-thawing crosscut; November, 402 feet; December, 436 feet; total progress in the 120 days, 1512 feet; total length of tunnel January 1st, 1756 feet. Average daily progress for the entire 120 days, $12\frac{6}{10}$ feet. Average daily progress for thirty days in December, $14\frac{5}{10}$ feet,

The best three separate week's records were: 107 feet, 110½ feet and 120½ feet. The poorest separate three week's records were: 25½ feet, 60 feet and 78 feet.

The tunnel was comparatively dry, only a few water seams being encountered. Only four or five sets of timbers were required. The size of the tunnel is 7½ feet high by 7 feet wide, with single 18-inch track, and a ditch 12 inches deep by 18 inches wide beside the track. Over this ditch is a walkway 2 feet wide, of 2-inch plank. The track is of 12-pound T rail, with 4x4-inch stringers. The ventilation was perfect through a 12-inch diameter No. 22 galvanized-iron pipe. Twenty minutes after blasting the men were able to commence work. In general, fuse and caps were used. Firing with a battery was tried and abandoned.

The formation was a black, compact lava or basalt and at times it was massive, exceedingly hard, short, tough ground. Once one round of holes required thirty hours for drilling. At other times the ground was a compact, brecciated basalt, much softer, but still firm blasting ground and requiring no timber.

The working force consisted at first of twenty-five men, in eight-hour shifts. There were twelve drillmen, six shovelers, three carmen and mule drivers, one boss who was also pipeman and trackman, one ditchman who also drilled holes for the pipe supporting eyebolts, and one blacksmith with helper. During the last six weeks of the time, finding that the two drills could make more than a round in eight hours, four drillmen were added to the force, making twenty-nine men in all and making drillmen's shifts of six hours. A round was nine to fourteen holes (usually eleven), depending on the ground, and the depth was 4½ feet. The engineers of the compressor were not counted, as they regularly ran the mill engine and incidentally attended to the compressor and exhaust fan.

The machine men were required to shovel back the broken ground far enough to secure a firm support for the drill column, which was vertical and carried two column arms, one for each drill. The stock of machine drills consisted of three old Little Giant No. 2 Rand drills and three new Slugger No. 33 Rand drills, the latter being used for the harder ground. At times, when the hard bands were encountered, four machines were in the repair shop. About twenty-one hours in all were lost, due to broken machine drill parts.

The powder used was Hercules No. 2. In drilling down holes, water was used from a 2-inch pipe and under a pressure of 75 feet, to wash out the clay and sediment. The men employed were Cornish miners, with few exceptions. Mules were used to haul six to ten ¾-ton cars per trip to the surface, after the tunnel had advanced 500 feet.

The prices paid are as follows: Labor, $3 and $3.50 per day; lumber, $33 per 1000 feet; mining timbers, 15 cents per running foot; freight from San Francisco or Chicago, 3 to 4 cents per pound.

The compressor was not run by separate boiler, but from the mill boilers, and was estimated to require two and a half cords of poor wood per day, costing $9 per cord.

The entire work was under the personal supervision of Thomas Davy, the foreman of these mines, and to him principally is due the credit for the rapid progress. Harry Goad was the single shift boss and S. Gundry the blacksmith.

The costs for the four months for the 1512 feet were as follows:

	Per Running Foot.	Total.
Labor (general superintendence not included)	$ 7 11	$10,751 17
Powder, fuse and caps	1 18	1,785 95
Fuel	1 48	2,237 75
Track, air and water pipe	1 04	1,566 75
Drill fittings	24	363 02
Freight on material	65	981 38
Sundries	65	993 71
Totals	$12 35	$18,679 73

PRODUCERS AND CONSUMERS of gas will alike be interested in the alleged new discovery of W. H. Cone, of Ottawa, Canada, of a new method of generating water gas for lighting and heating. An apparatus has been installed in Ottawa for making the gas by this new method, wherein hydrogen is generated by the decomposition of water by electricity and made to permeate coal oil or any heavy carbon oil. In this way the hydrogen becomes carbonated, and when mixed with air makes an illuminating gas which Mr. Cone says can be produced at 40 cents per 1000 feet. The process is his secret. "Secrets" now-a-days are doubtful in science or mechanics, but Mr. Cone is forming a company with a capital stock of $100,000, to operate the system. He is a chemist, and says he stumbled upon this new method of generating the water gas while he was endeavoring to find a means of generating oxygen for medicinal purposes.

AT present the largest use of aluminum is for electrical conductors, next coming its employment as a deoxidizing agent in steel making, then as a material for bottle and jar caps, and next for the manufacture of "advertising novelties."—Electrical Review.

Improvement in Clip for Wire Ropeway.

Evolution and progress characterize every device and apparatus connected with the mining industry. The wire ropeway, now becoming so generally known and appreciated, affords example of this. A late improvement in this regard is noted in the Hallidie ropeway, manufactured by the California Wire Works, 9 Fremont St., San Francisco. Till recently the strap clip (Fig. 1), patented Feb. 12th, '92, was

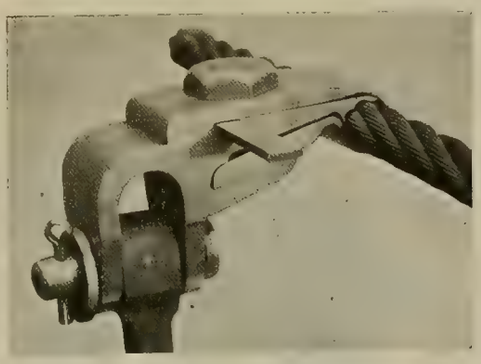


Fig. 1.—Strap Clip.



Fig. 2.—Center Clip.

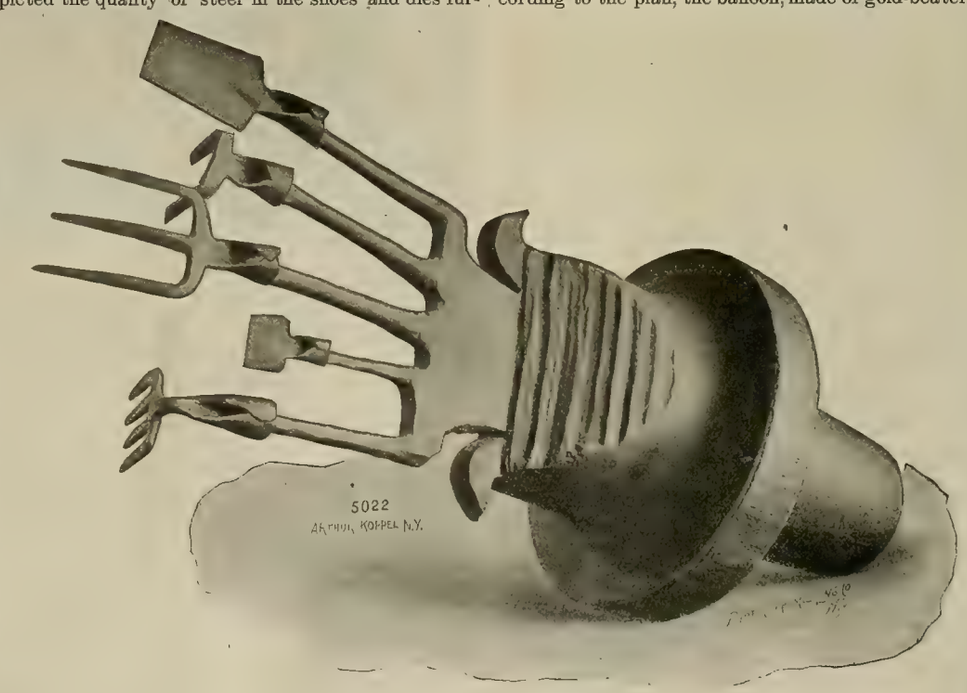
used; this steel clip was in five parts—shank, leaf, key, bolt and nut—the leaf or strap encircling the rope and with the other devices holding the shank in place. A newer device, patented by A. S. Hallidie last May, simplifies the arrangement, permitting easier passage on the rope, the station sheave and horizontal end pulleys. This latter clip is illustrated in Fig. 2. Tests indicate an ability to sustain 2500 pounds without being strained or pulled out of place.

Novel Test of Stamp Shoe and Die.

In the accompanying illustration is graphically depicted the quality of steel in the shoes and dies furnished by Arthur Koppel, 66 Broad St., New York City.

The shoe and die from which were fashioned the fork and other implements was used in a battery in the mill of the Village Main Reef Gold Mining Company, in the Witwatersrand district of the Transvaal, South Africa, where the stamps pounding on the ordinary banket ore of that region weigh each 1200 pounds. During four months in '99, from May to August, there was a special test of shoes and dies in the mill mentioned, the Koppel shoes running 108 days, and the dies 120 days, the average wear per shoe for sixty days being 5.48 inches for the Koppel shoe.

After the 1200-pound stamp had pounded on the Koppel shoe and die for the time mentioned, the worn piece of steel was given to a smith, who forged from it the implement shown in the engraving, showing how fine the grade of steel that made it possible to so work an old piece of Koppel steel after such hard usage, thus demonstrating its toughness and resilience.



A Novel Test of Shoe and Die Steel.

Regulations with Regard to Pig Lead Made from Canadian Bullion.

The following memorandum has been issued by the Customs Department of Canada: It is ordered that pig lead, when refined outside of Canada from lead bullion which has been produced from Canadian silver-lead ores smelted in Canada, shall be admitted into Canada, until otherwise provided, upon payment of duty on the cost of refining the pig lead, as determined by the Minister of Customs, subject to the following regulations, viz.:

1. The lead bullion shall be exported under customs' supervision at the expense of the exporter and consigned direct to the refinery. The export entry, made in quadruplicate and attested before the Collector of Customs, shall be certified by a customs' officer after verifying the quantity shipped for exportation. The collector of the port where the export entry is made shall retain one copy of each entry on file in his office, and shall forward one copy each (a) to the Canadian frontier port of exit; (b) to the Department of Customs, Ottawa; (c) to the refinery.

2. Pig lead refined from Canadian silver-lead bullion, smelted and exported as aforesaid, may be entered at the port of Montreal or other port designated by the Minister of Customs, upon payment of duty upon the cost of the refining thereof, as determined by the said Minister, provided that there shall be produced with the importer's bill of entry, and annexed thereto, a copy of the Canadian export entry of the bullion and the invoice from the refiner, duly attested before a notary public in the form prescribed by the Minister of Customs, showing the product of such bullion and other particulars.

3. The invoice for customs entry of pig lead refined from Canadian smelted silver-lead ores may be made in the form in schedule "A," and the import entry may be made on the usual form, under the following descriptions: "Pig lead refined from Canadian smelted silver-lead ores at cost of refining."

A copy of the invoice is to be attached to the import entry forwarded by the collector to the Customs Department.

AN electric balloon for night signaling is among the latest ideas, especially for use in the Boer war. According to the plan, the balloon, made of gold-beaters' skins, carries a number of electric lamps, which are connected by wire with an apparatus below. These lamps are flashed at intervals corresponding to the

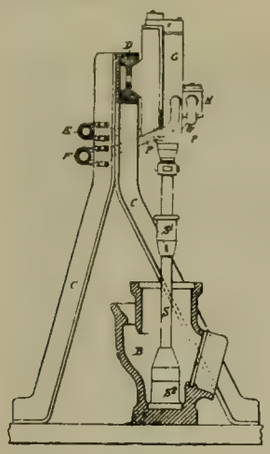
dots and dashes of the Morse code, and on a clear night can be seen 100 miles away. The balloon may be sent up some distance from an army, connection with the ground apparatus being made by wire. The chance of the balloon being hit by sharpshooters is small, as it is sent up at night, and unlighted, so that when the signals are begun it is out of range. A number have been sent out to South Africa to be tested.—Electricity.

Latest Mining and Metallurgical Patents.

Patents Issued Jan. 30, 1900.

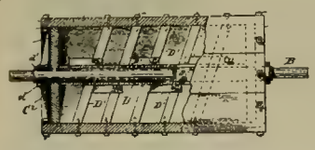
Specially Reported for the MINING AND SCIENTIFIC PRESS.

STAMP FOR CRUSHING ORES.—No. 642,152; F. A. Parnell, London, England.



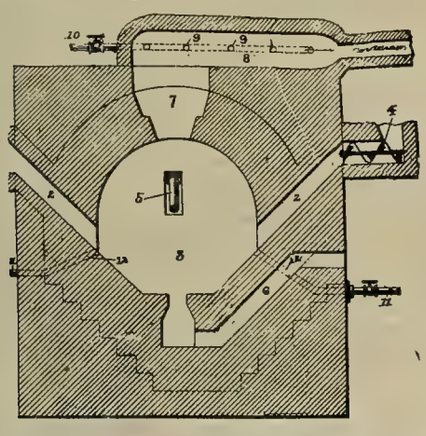
In stamps for crushing ore and the like, combination with shoe and base A, of frame C rising from base, consisting of inclined braces connected together at top, diverging at bottom, respectively connected to base at front and rear; cross-beam D carried by upper side of frames at one side of vertical axis of die, cylinder G carried by cross-beam, piston L in cylinder, connected to shoe for reciprocating it, and means for revolving piston.

AMALGAMATOR.—No. 642,202; J. L. Bradbury, San Francisco, Cal.



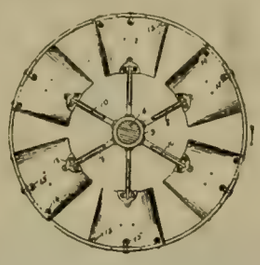
In an amalgamator for treatment of pulp, slime or tailings, the combination with closed receiver or vessel for material to be treated polygonal in cross-section, of feed opening therein, cover for opening, drive shaft extending through receiver or vessel, and to which same is secured, means for imparting rotary motion to the shaft so as to rotate the receiver or vessel, a covering for that portion of shaft within receiver or vessel, a series of breaking arms arranged therein so as to rotate with the shaft and receiver or vessel, arranged at an angle to each other, end plates secured to receiver or vessel outside of its heads or ends, each plate being formed with a bearing hub within which the drive shaft is secured, and of an outlet for the treated material.

PROCESS OF MAKING SULPHURIC ACID.—No. 642,390; F. P. Van Denbergh, Buffalo, N. Y.



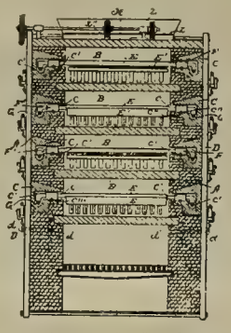
Manufacturing sulphuric acid free from arsenic, nitrogen oxides and other common impurities, subjecting calcium sulphate or gypsum and a flux to heat and electrolysis, both produced by an electric current within a furnace chamber containing the materials and applied directly to and through them while in a molten condition in the presence of an excess of oxygen, thereby forming sulphur oxides, and subsequently hydrating these oxides.

APPARATUS FOR VENTILATING MINES.—No. 642,234; C. P. Kenyon, Scranton, Pa.



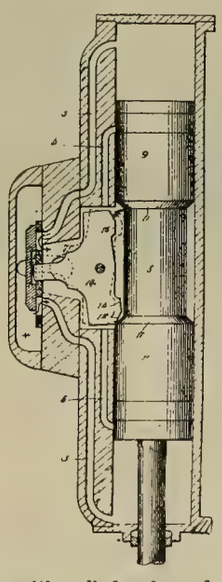
A fanwheel with fans or blades 7 provided with notches 12 at their outer ends, and ring 20 encircling fans and extending through notches, the ring being adapted to hold the fans at their proper relative distances and also in their proper plane; in combination with bolts or rods 13 extending from ring to corners of fans, bolts being curved and provided with long threads and adjusting nuts to draw the blades into twisted positions.

ORE ROASTING AND DESULPHURIZING FURNACE.—No. 642,334; A. C. Johnson, Baltimore, Md.



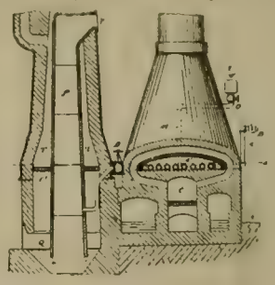
In an ore roasting and desulphurizing furnace, longitudinal side beams with slots or pockets containing endless chains or cables adapted to be reciprocated in and extending to and supported on outside of furnace, posts or buckstays ranged along exterior sides of furnace, idlers on posts or buckstays, reciprocating rakes connected to the chains or cables, and buckstays or posts at one end of frame provided with slots or loops formed as continuation of slots or pockets in beams, and means for reciprocating chains.

ROCK DRILL.—No. 642,463; H. Koch, North Tarrytown, N. Y.



A rock drill, with cylinder formed with chamber therein, communicating directly with interior of cylinder and with atmosphere, a steam chest attached to cylinder, communicating with chamber therein, drill having feed ports passing from steam chest respectively to ends of cylinder, and drill also having exhaust ports passing from chamber in cylinder respectively at points intermediate to ends of cylinder and such chamber, a valve mounted in steam chest and serving alternately to open feed ports and to connect them with chamber in cylinder, means mounted in chamber for transmitting movement to valve and piston working in cylinder and actuating such means.

PROCESS FOR PRODUCING ALLOYS OF HYDROGEN AND IRON.—No. 642,320; G. W. Gesner, New York, N. Y.



The process of producing a malleable alloy of iron and hydrogen by first puddling the iron, subsequently reducing it to a form presenting a greatly extended surface, heating such iron in the presence of free hydrogen and allowing time for the iron to absorb the hydrogen, subsequently detaching and melting the scale thus produced and again mechanically working such alloy.

Not Considered a Just Ruling.

A decision of the Commissioner of the General Land Office, dated January 23, 1900, addressed to the Register and Receiver of the Los Angeles, Cal., Land Office, is that no hearings against "scrippers" titles will be ordered by the General Land Office at the instance of the mineral claimants, unless the protests filed against the scrip entry show that the land in question is actually producing oil in valuable quantities.

The decision, in part, reads: "December 22, 1899, James W. McDonald, Los Angeles, Cal., filed in this office a protest and petition for a hearing. The protest alleges the location of the La Mililla mining claim in conflict with the above selection. The affiants claim to have thoroughly prospected the land and find that it is mineral land, containing great deposits of petroleum; 'that a vein of petroleum running all through the said land is most clearly and unequivocally defined. There is so much petroleum therein contained that the same has forced its way to the surface, and the superficial earth is so completely saturated with petroleum that it burns when the light is applied to it. In several parts where there are declivities the oil in a liquid state exudes from the sides of the banks.'

"The protest does not, even with the showing made, present sufficient reasons to warrant this office in allowing an order for a hearing. The date of the mineral locations is not shown, but there is lacking the essential consideration in all this class of cases: specific evidence of the development of the land for its mineral product and the production therefrom in quantities and qualities sufficient to indicate that the land is more valuable for mineral than for agricultural purposes. In the absence of this a hearing should not be ordered."

New Steam Drier.

An apparatus for depriving steam of surplus moisture on the way from the boiler to the cylinder has been invented by M. E. Leppik of Warsaw. It depends for its action upon centrifugal force. The steam passes through a turbine fixed in a drum in which centrifugal tendency causes the particles of water to become separated from the steam and to descend through a tube into a boiler, the dry steam passing through another tube to the engine. The steam pressure, being less than the pressure within the boiler, causes the steam to flow through the turbine into the drum, and passing through the turbine channels in a tangential direction towards the circumference of the drum, the centrifugal force takes effect on the particles of steam. This force produces a tendency in the water to describe large circles, thus collecting on the walls of the cylinder, while the steam, being lighter, acquires a rotating motion in the middle part of the drum and in a dry state passes to the engine.

A PAPER published in a mining district has an invitation to the public to come and inspect the resources of the section. It says: "All the intending investor need do is to signify what kind of mines he is looking for, and they will be shown him." This is certainly a convenient state of affairs, in view of the difficulties experienced elsewhere in the search for mines. Such reckless statements can do no district any good.

AT Wrightsville, Pa., it is proposed to spend $5,000,000 on a dam and dynamo outfit, to utilize the water power of the Susquehanna river in furnishing electric light and power.

IN the California Legislature this week the mining law of '97 was repealed.

Notes on Handling Dynamite.

Written by W. R. QUINAN, Superintendent California Powder Works.

Dynamite should be stored in a cool, dry place. Nitro-glycerine is a liquid with a high boiling point, but it evaporates sensibly at temperatures a little above the normal. At a temperature of, say, 100° Fahr., the loss is serious in proportion to the time of exposure. In this way the powder may be much weakened. In a damp place it will absorb moisture, and if it is stored for any length of time it will be spoiled.

THAWING.—Probably two-thirds of the fatal accidents that have happened with dynamite have come from careless methods of thawing. Dynamite freezes at about 45° Fahr. In this condition it is stiff and hard, and should not be used for blasting, as it is insensitive to the ordinary detonator. The powder is a poor conductor of heat, and for this reason it freezes and thaws slowly. The time required to thaw it thoroughly when it is once solidly frozen is much greater than most people think. Shut in the boxes in a magazine, it will remain frozen even in summer for many weeks.

The thawing of dynamite is always attended with danger if it is done rapidly at a high temperature. The danger is in direct proportion to the temperature. No matter how urgent the haste may be, the temperature used should never exceed 100° Fahr. A dry heat should be used—that is, the powder should not be brought in direct contact with hot water or steam. Water tends to make the nitro-glycerine exude, and also attacks the chemical salts in the composition. Where the object justifies the expense, it is a good plan to keep the exterior of the magazine at a moderate temperature—say 60°—which will prevent the powder from freezing.

Steam pipes should never be used inside of a building where powder is stored. The best method of heating is the well known hot-water system used for dwellings. In this the circulation is active, and the arrangement such that the water cannot be brought to the steaming point, or even overheated. It has been found that a maximum temperature of 104° in the water gives an active circulation. The heater is located at a safe distance, and the water circulates through the pipes in the building and returns to the heater. The pipes outside the building are well protected and covered to prevent loss of heat, and the building should be made as impervious to heat as possible.

Double walls, floors, and ceiling with a sawdust filling answer every purpose, but the building must be made absolutely tight. A crack under a door or window will counteract the best heating system that can be made.

If steam is available, a very cheap and efficient system of heating a small building is as follows: On the outside of the building a sheet-iron drum is set up and connected with another inside. Two pipes pass through the wall connecting the drums near the top and bottom. The outside drum is set a little lower than the other to provide for the overflow of the water. The holes through the walls are packed around the pipes with waste or tow. Water in the outside drum is heated by a small steam pipe, and circulates through the drums. The room is kept warm by the radiation from the inside drum. If the building is tight and properly insulated, the amount of steam necessary is very small. To prevent the vapor from making the room damp the drums are closed on top with wooden lids covered on the under side with cloth soaked in paraffine. The sheet-iron drum used for the transportation of glycerine or coal oil is well suited to this work.

When dynamite is being used in winter on a large scale, as at a mine, it would pay to build a small thawing room of this kind—say 12 by 16 feet. The powder used for the day's consumption could be carried in and left for twelve hours or more, the boxes being simply opened or the powder taken out and put on shelves, depending upon the time available. A temperature of 75° or 80° maintained during the night would suffice to thaw the powder. A thermometer should always be consulted to regulate the temperature of the room, which should not exceed 85°.

This particular arrangement for a thawing room is convenient, but it may be varied to suit the case. The essential feature is a tight, heat-insulated room, kept at a moderate and regulated temperature.

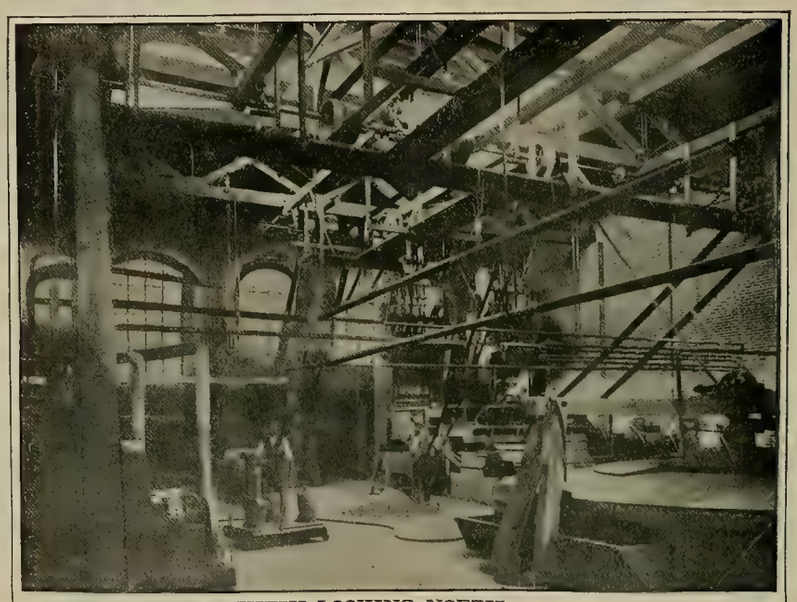
The plan of a thawing room is much better than using thawing stoves. The best of these are liable to get out of order, if not originally dangerous. The thawing room has great capacity, so that the work need not be done in a hurry, and has always this advantage over a small apparatus: Any excess of temperature brings discomfort to the operator, and so gives warning. A room in which a man can work without distress is safe for thawing dynamite.

In no case should any apparatus for thawing powder be used in a magazine or building where a large quantity of powder is stored. The same warning applies to the handling of caps in the preparation of primers.

CHARGING.—In charging a drill hole use a wooden tamping rod. If the hole is dry, cut the cartridges into short lengths and slit them along the sides, so that when driven down with the rod the powder will spread and fill the inequalities of the hole. The primer, with the cap carefully attached, should be put in last—that is, on the top of the charge. The hole is then to be filled and tamped with care. Earth or clay mixed with gravel makes one of the best tampings. In a wet hole leave the cartridge intact for the better protection of the powder.

St. Louis Sampling and Testing Works.

These works were built to afford an opportunity of testing and treating ores, on a working scale, so as to determine their value and the best and cheapest practical method for their reduction. In the design and construction of the works no time nor expense was spared to make a model plant, supplied with every requisite. The works are on Spruce street, one square from Union Depot. The building is of brick, with a frontage of 60 feet on Spruce street and a depth of 139 feet. A clear span truss roof covers



VIEW LOOKING NORTH.



VIEW LOOKING SOUTH

the whole so that the floor space is not interfered with by posts or columns. The floor of the mill, except near the furnaces, is laid with granitoid flagging, which has a smooth, hard surface easily kept clean, facilitating the attainment of accurate results. The water supply is from the city main, with a 6-inch connection.

The accompanying views will give some idea of the character and scope of the plant. The sampling plant consists of rock breaker 10x4, weight two tons; belt rolls, 10x16, weight 3500 pounds; and sample grinder, with ample floor space for handling several lots at a time. The gold mill has an automatic ore feeder; a 3-stamp battery, with 650-pound stamps; electro-plated copper plate, 30 inches by 8 feet; blanket tables, etc.; full size vanner and table for concentrating the tailings; reverberatory furnace, capable of taking a 900-pound charge of average ore, for roasting sulphuret ores; chlorine generator and tanks for treatment by chlorination; and two 3-foot iron pans for amalgamation. The silver mill has an automatic ore feeder; a 5-stamp battery, 650-pound stamps, total weight ten tons; full set of screens of different sizes; settling tanks; two 3-foot iron amalgamation pans, weight 3500 pounds; one 6-foot settler, weight 3400 pounds; tailing tanks; reverberatory roasting furnace with dust chambers and 8′x8′ hearth for roasting or chloridizing ores; a full set of tanks arranged with ample fall, giving facilities for working ores by leaching or wet method. For crushing by rolls the works have a rock breaker, two pair belt rolls, 10x16 inches, elevator and screen trommel. Retort and melting furnaces complete the silver plant.

The concentration plant embraces rock breaker, stamp battery, two pairs belt rolls for crushing; a 31-foot cup elevator; four revolving sizing screens, each 36 inches by 5 feet; three crank-motion, double-compartment jigs, each 3x6 feet, with tray 20x32 inches; three eccentric-motion, double-compartment jigs, each 3x6 feet, with trays 20x32 inches, jigs provided with cone pulleys for changing the speed; a 15-foot hydraulic separator; a spitzkasten, or pointed box, 15 feet long, with four compartments for slime classification; revolving table, 20 feet in diameter; vanner, 4x12 feet; hand jigs and riddles for smaller tests, the whole forming a complete ore-dressing establishment of unusually large capacity.

The plant for testing fuels includes:

(a) Complete machinery for the washing of impure coals and coal slack, viz., two pairs of belt rolls, 10x16; cup elevator; four trommel sizing screens, each 36″x60″; six plunger jigs (three with crank and three with eccentric motion), each with trays 20″x32″; classifiers and slime machines.

(b) A coking oven 2½x4½x6 feet, provided with side wall and bottom flues, and so arranged that it can be used as a plain oven of the Welsh type or on the Belgian system, affording facilities for thoroughly testing the coking properties of coal upon a full working scale.

(c) A 54″x16′ return flue steel boiler, thirty-six 4-inch flues, provided with all appliances for making complete fuel trials, including arrangements for taking samples of stack gases for analysis.

The fullest provision is made for sampling ores, all classes of mineral substances and metallurgical products. All kinds of engine, boiler and furnace tests are undertaken, as well as measurements of power transmitted through engines or shafting, tests of steam and other pressure gauges, electrical apparatus, etc.

MINING SUMMARY.

ALASKA.

G. C. Hazlett of Omaha, Neb., has shipped for the Chisna River M. & I. Co., for working placer districts on Chisna river, which empties into the Copper river near Valdes, a $20,000 plant.

CAPE NOME.

Report to the State Department, dated December 8, from Reynold Morrison, Vice-Consul at Dawson City, is that many people are making preparation to get to Cape Nome from Skaguay, via Dawson, over the ice, a journey of 2600 miles. He says if all who are contemplating it make the trip this winter, there will be one continuous line of people from Bennett to St. Michael. The transportation companies have already arranged to handle 3000 passengers. The route to Cape Nome, via Dawson, is said to be four weeks earlier than the all-sea route, because of the open water along the shore north of the Yukon river. The weather at Dawson was reported as comparatively mild, from 15° above zero to 18° below. The mildness has interfered with mining by flooding the drifts, and the gold output will fall short of the estimate of $25,000,000.

ARIZONA.

COCHISE COUNTY.

Tombstone reports that A. L. Grow of that place, representing New York men, has an option on eighty claims, old silver producers of that camp, and contemplates draining them.

PIMA COUNTY.

Citizen: Mexican miners at the Ray mine have worked ten-hour shifts for $2. Recently, that all might work during a quiet time, they have received $2 pay for eight hours work. Being required to resume the old schedule of ten hours, the entire gang decided to strike and now demand $3 per shift for eight hours. They declare they have provisions for two months and will not allow other miners to work in the mine. They were all formally discharged by the company. The probability is that the mine will stay shut down until the railroad from Ray to Calvin is completed and the new 200-ton concentrating plant at the latter place is ready to operate.

Oasis: The Temporal M. Co., H. Barnett, Mgr., is developing mining property in the Wrightson district, seven miles west of Crittenden in the Santa Cruz mountains. They are down 112 feet on the Acme mine, with 60 feet of drifts in the bottom of the shaft. The ledge is 4 feet wide with a pay streak varying from 12 to 18 inches in width. Ore extracted runs 50% lead and forty to seventy ounces in silver.

YAVAPAI COUNTY.

(Special Correspondence).—The town of Congress, where the celebrated gold mine of that name is situated, lies about three miles north of Congress Junction, a station on the line of the Santa Fe, Prescott & Phœnix railroad, and contains a population of 1200. This famous gold mine was discovered a good many years ago by D. May, an old prospector, who developed it to some extent, and in 1887 sold it to "Diamond Joe" Reynolds for $60,000. In 1889 Reynolds put up a 20-stamp mill on the property, which ran for sixteen months, when twenty more stamps were added. This was before the advent of the railroad, and everything had to be freighted to Prescott at a cost of $17 per ton. In 1891 the railroad was projected, and "Diamond Joe" concluded to wait until it came. Up to this time it had produced $750,000. While it was shut down the present owners, known as the Congress Gold Co. and composed of Messrs. E. B. Gage, F. Murphy, N. K. Fairbanks and some Eastern people, purchased it at $1,000,000, at which figure it is capitalized. It was started up in March, 1894, since which time it has been running to its fullest capacity day and night. The mill has a capacity of 100 to 110 tons of ore per day, which will average $20 per ton in gold, and the cyanide plant, which is working on the tailings, considered to be the most complete of its kind in the Territory, reduces 110 tons of tailings which average $6.50.

There is no free gold in the ore, the values being found in a white quartz filled with pyrite. This is one of the deepest mines in the Territory, the deepest incline being 2700 feet in depth and it is said that at the bottom of this shaft there is no change in the character, value or size of the ore body. There are five steam hoists on the property, and the gross output approximates $1,000,000 a year. The property consists of twenty-five claims and there are between twelve and thirteen miles of workings underground. There is reported to be ore enough in sight to last for years. There are 350 miners employed. W. F. Staunton, formerly of Tombstone, is the Supt. in charge.

At the base of the same range of mountains in which the Congress mine is situated and five miles east of Congress Junction is Fool's gulch, where mining has been going on for nearly thirty years. A small force of men is at work at present and a 10-stamp mill reduces the ore, although not running full time. Stanton, also in the same range, is nine miles east of Congress Junction, and is an old mining camp. Three miles beyond Stanton is Weaver, one of the oldest gold mining camps in the Territory, gold having been found on Rich hill in 1862, at which time several hundred thousand dollars were found in nuggets of various sizes. Quartz ledges were afterward discovered and a 10-stamp mill erected, the tailings from which are now being worked by a small cyanide plant, which has thus far reduced 3000 tons running from $5 to $10 per ton. This camp is taking on new life and promises to rival Congress. The Octave G. M. Co., composed of Pennsylvanians, has bought twenty-five claims (four of which, the Johnson, Peterson, Leviathan and Rumor, have been producers) for $80,000, and 200 men are developing the old workings, in one of which a 3-foot ore body carrying $25 per ton in gold has been opened up. The foundations for a 40-stamp mill are being completed and the mill will be in running order by the first of June. A town of tents has already sprung up and the company has several handsome frame buildings of California redwood nearing a state of completion. D. J. Jones is Supt. of this property.

Congress, Feb. 3.

The Jerome M. & S. Co. has capitalized at $1,500,000; secretary, T. H. Brown; manager, Doane Merrill. The mines are located in the Black Hills district.

YUMA COUNTY.

(Special Correspondence).—West of Congress Junction sixty-five miles lie the Hacuvar mountains and the Harqua Hala district, where the old Cunningham mine is situated, from which in the early days ore was shipped down the Colorado river, through the Gulf of California to Swansea, Wales. Well-known writers on mineralogy declare this to be a rich mineral belt. The formation is granite with dykes of porphyritic shale. The veins lie in a contract between granite and diorite. Messrs. Kelly and Bullard have relocated the Cunningham mine, cleaned out the old shafts and put down three new ones, finding at water level ore running $125 per ton in gold and copper. O. L. Gear and associates, Eastern men, have located thirty-five claims in this mineral belt. The deepest shaft in the district is 230 feet and was sunk by Mr. Burson of Phœnix and his Denver associates, who have a body of sulphides.

Harqua Hala, Feb. 1.

Prospect: The shaft on the Fortuna mine is down 900 feet; ore body unchanged. A 20-stamp mill is in operation and a cyanide plant takes care of the tailings.

CALIFORNIA.

CALAVERAS COUNTY.

(Special Correspondence).—Angels is the center of much mining interest, not only because are located here some of the largest active properties in Calaveras county, but because the routes of travel for the southern part of the county converge here, and mining people congregate at the hotels.

The dominant enterprise of the town is the Utica M. Co. With the original Utica mine as a nucleus, the company has extended its holdings until now it owns much of the mineral land within the town site and immediate vicinity. It is extending its underground operations beneath the homes of the people, but by agreement with lot owners is presumed not to come nearer than 500 feet from the surface. It has three shafts, within a stone's throw of each other, in the heart of town, viz., the Utica, the Stickles and the Cross. Clustered about the Utica hoist and mill are the structures which accommodate the various departments of the business—sawmill, machine shop, storehouses, office buildings, etc.

Ore from the Utica shaft is crushed in the 60-stamp mill located close to the hoist. The sulphurets from this mill are conveyed in buckets by a wire rope tramway to the sulphuret works of the company, on the east bank of Angels creek, one-fourth of a mile distant. On the side and crest of an intervening hill are the Stickles and Cross shafts, which send their ore to the 60-stamp Stickles mill, on the west bank of the same creek. Besides the three shafts above mentioned, the Utica Co. controls or owns the Gold Cliff mine and mill, half a mile north of its other properties. The Gold Cliff hoist is in an open cut from which the ore was removed in former years. There is here a fine illustration of the great width of the main vein of the mother lode, as the cut accommodates the hoist with its necessary machinery without crowding. Within recent years a shaft 400 feet deep has been sunk at the Gold Cliff. The walls here are almost vertical, necessitating little timbering. The ore is hauled to the old Madison 40-stamp mill, on the north bank of Angels creek. Near the Gold Cliff mill is a blanket plant for the mills above, from which the sulphurets are hauled by wagon to the cyanide plant. The Utica Co. has an extensive water and electric system of its own, and, besides securing its power and light from this source, is in the market to sell power to other enterprises, being an active competitor in this line. It supplies electric lights to the towns of Angels and San Andreas. Its principal power plant is at Murphys, with sub-stations at Angels, San Andreas, etc. The Utica is an extensive enterprise in many ways, and its activities and developments have contributed to the prosperity and prospects of southern Calaveras county. L. W. Shinn is general superintendent for the company, W. J. Loring is superintendent of mills, and W. B. Miller general mine foreman. It gives employment at Angels to nearly 600 workmen.

The Lightner mine is the nearest active neighbor to the Utica, joining that property on the north. A recent accident at the Lightner was caused by a breaking through of the walls between the Lightner and some old workings at the Utica. The shaft at the Lightner is down 500 feet. The hoist is run by steam, but the mill and air compressor get their motive power from electricity supplied by the Standard Electric Co. There are forty stamps and twenty concentrators in the mill. The sulphurets are sent to the Utica Co.'s works. H. F. Whirlow is superintendent of the Lightner, Owen Owen foreman. One hundred men are employed. The owners of this property are mainly Stockton people.

The next mine on the north, joining the Lightner, is the Angels (or Fox) mine, owned by J. V. Coleman. The ore from this mine has been worked at the old Baumhogger 10-stamp mill (leased for the purpose). Mr. Coleman will build a 20-stamp mill near the hoist, to be run by electric power. The equipment consists of a double steam hoist (40 H. P.), capable of sinking 600 feet. Present workings are to a depth of 300 feet. A vertical air compressor is also operated. About forty men will be employed at the Angels after completion of the new mill. A. S. Buckbee is superintendent of the property.

The properties above mentioned, with the exception of the Gold Cliff, are located upon the most eastern of the system of three parallel veins which course through this locality. The Gold Cliff is upon the main or mother lode. Joining the Utica properties on the south, and across Angels creek, are the Drakes Properties, Ltd. At present matters are at a standstill, awaiting developments. South two miles is the Bruner, now known as the St. Lawrence, a consolidation of several claims. Work here has been suspended for a time owing to a scarcity of wood for steam purposes. A. J. Cameron is superintendent in charge. Farther south is the Santa Ana mine, near Carson Hill. Much work in the way of development has been done here, but apparently with indifferent success. The machinery is now idle and the plans of the company are not known. The property is owned mainly by Salt Lake parties, with J. J. Peirano, foreman, in charge.

At Angels the property joining the Gold Cliff on the north, on the main vein, is the Brown, Smyth & Ryland. There are prospects that company matters may be adjusted so that development may begin. The ore taken from the different veins, and especially from the main vein, is of good character. C. D. Smyth is in charge.

The most active of the mines on the west belt is the Libra mine, formerly known as the Blair Con., two miles from Angels. It is milling good ore. Its main ledge has been crosscut for 93 feet without striking the hanging wall; depth attained in the shaft, 500 feet, with 700 feet in drifts, largely at the 400 level. This is the deepest mine on the west belt. The equipment consists of a steam hoist, an air compressor and a 10-stamp mill. The stock of the company is owned principally by New York people, with J. J. Schmadeke, a Californian, in charge as superintendent. Fifteen men are employed.

There are several mining claims in the vicinity of Angels, from most of which good things are expected. Angels will be a lively mining town for years to come.

Your correspondent visited Copperopolis and the adjacent region, being lured to the site of the famous copper property by the reports published broadcast several months ago to the effect that operations at this abandoned camp were about to be resumed and that the streets of the old-time city would again assume an aspect of life and bustle. He was disappointed. To a limited extent, work has been resumed at the Union copper mine, but this work is confined to the unwatering of the shaft and levels. The water is being raised in large tanks by means of a strong double steam hoist, one tank descending while the other ascends. The water has been lowered to a point 500 feet from the surface, and it is calculated that about six weeks will be required to unwater the 150 feet yet remaining. Then the mine will be in condition to resume work, or to be examined by intending purchasers. Locally, it is thought the latter purpose is the main one in pumping out the mine. If the Ames estate of Boston, which owns the property, contemplated working the mine, they would before this have begun repairs upon the dilapidated equipment and buildings, to say nothing of the reduction of the crude ore already piled for roasting. But, as the mine is of unquestioned value, possibly one of the corporations whose experts will examine it may conclude to pay the price demanded by the Ames people. The water first taken from the mine when the last pumping operations began was strongly charged with copper. It was run through sluices filled with scrap tin, and every few weeks there was a clean-up of the precipitated copper cement. The water does not now carry so much copper in solution. Part of it is run upon the top of a large heap of roasted ore, left from old workings, and, after leaching through the ore, is conducted into sluices where the copper cement is obtained as before described. At present the clean-up every three or four weeks yields from 5000 to 6000 pounds of copper cement. This cement is excellent for the manufacture of red paint, or it may be smelted and the pure metal obtained. G. McM. Ross, who has charge of the property, is now in Virginia City, Nevada, leaving work in the hands of a local foreman.

The Royal Con. mines are two and one-half miles northwest of Copperopolis, in Salt Spring valley. The cluster of buildings about the mine has been given the name of Hodson, which is the postoffice address of the employes. Locally, the mine is often spoken of as Pine Log, which is the appellation of one of the claims in the group, the Royal, Ant Hill and Good-enough being other claims. All are incorporated under the title first given, with English people as stockholders. The original locations were made many years ago, but capital was slow to experiment with these mines, believing that they were too far west to be within the profitable mineral belt. This is a low foothill region. The present company, however, have demonstrated that, although they have a low-grade proposition, it is one of such magnitude that they are warranted in the further investment of capital. For two years they have been operating a 40-stamp mill. Ground is now being cleared and some of the lumber is on hand for a new 120-stamp mill, which will be erected on a site entirely apart from the present 40-stamp equipment. This will give the company 160 stamps. The hoist is located on the hill, nearly half a mile from the mill. The new mill will be considerably closer. Ore is run in cars by gravity, horses being employed to haul the cars back to the hoist. At the mine there is a fine friction hoist and an air compressor, both run by steam. Wood can be had for $3.50 to $4.50 per cord, so it is not probable that electricity will be used as motive power. Water power is out of the question, as no supply is available. Pure water for use in the boilers and in the mill is brought to a private reservoir holding over 1,000,000 gallons from Salt Spring reservoir, several miles distant, and pumped where needed. A Cornish pump raises some water out of the mine, but this is so strongly impregnated with salt and alkali as to be unfit for use. Although the ledge in the mine is of vast dimensions, and inclines but 30° from the horizontal, little timbering is necessary, as this is the best standing ground in the State. Of course, occasional pillars are left in the working to support the hanging wall. The mine has produced no waste rock, the entire vein matter being sent through the mill. The shaft is down 900 feet on the incline. At the mill, besides the forty stamps, there are twelve concentrators. A dynamo has been installed to furnish lights for the hoist, mill and town. About 100 men are given employment. Geo. Kemp Van Ee is Supt.

The Melones Con. G. & S. M. Co. is now doing little work on its properties at Robinson's Ferry. Operations toward the erection of the 120-stamp mill were discontinued early in the winter, when the impassable roads made it impossible to bring in the heavy foundation timbers. The grading and the cement work for the mill have been finished, and much of the machinery is on the ground. The big flume to convey water for motive power has been completed, but most of the work at the diverting dam in the river will have to be done over again next summer, having been carried out by the early flood

waters last fall. The tunnel that is being driven through Carson hill to strike the ledge near the other side is now in about 2000 feet, but there are still 2000 feet to run. On this part of the work there will be no cessation until it is completed. This will require several months. The tunnel will tap the lode 1200 feet from the surface of the hill. With an immense vein to work upon, there will be no trouble to keep the 120-stamp mill busy.

Angels, Feb. 5.

The Sheep Ranch gold mine, after being shut down for six years, has started its new 20-stamp mill. The shaft is down 1200 feet. Over 50,000,000 gallons of water were taken out of the mine since Sept. 1st, '99. There are sixty men working.

EL DORADO COUNTY.

At Nashville the Chicago M. Co. expect to begin work on their property soon.

KERN COUNTY.

The Tulare O. & M. Co., operating in the McKittrick fields, are reported to have struck oil at 400 feet. The tools went through several strata of jet, one 36 inches in thickness.

The California Construction Co. has a contract with the Power Development Co. to bore a tunnel at Kern River canyon, 8425 feet, to be tapped by adits, through which debris may be removed. Its course will be in the main parallel with the river; it will be 6 feet 9 inches high to the center of the arch and 7 feet 2 inches wide. A permit has been granted by the Secretary of the Interior covering that portion of the territory within the forest reserve. It is stipulated in the contract that the work shall be completed within 210 days.

LOS ANGELES COUNTY.

At Whittier the Home Oil Co. is putting up a 1000-barrel tank of corrugated iron, and putting in larger distributing pipes. Its No. 6 well is pumping 175 barrels daily. In the Central Oil Co.'s field rigs Nos. 21 and 23 are up, and Nos. 24 and 25 are ordered. The Fidelity Co. is figuring on a pipe line to the railroad.

MARIPOSA COUNTY.

Near Coulterville the Buffalo Bill, an extension of the Columbia, is bonded to a company who will begin work soon. A mill and mining machinery are on the ground.

Supt. Bisland of the Nameless mine has bonded the Elizabeth mine and will develop it in connection with the Nameless.

NEVADA COUNTY.

E. D. Boyle has bonded the Hussey mine in Willow valley, Nevada City district, and will soon begin operations.

Grass Valley Union: A crushing of rock from the Jenny Lind mine was made at the Maryland mill; the results were better than expected. Supt. Stocks reports a large ledge. The company intends soon to erect a mill on its property.

Herald: It is expected that all of the water will be out of the Coe mine soon, as the pumps have been running steadily for several weeks.

PLACER COUNTY.

The Michigan Bluff M. Co., at Michigan Bluff, has two shifts running. A large tunnel, well timbered, is now in over 300 feet. The company is operating the property formerly known as the Burns Con. Mexican Placer mining claim. The tunnel will strike 40 feet below the channel.

SAN BERNARDINO COUNTY.

The Rose G. M. Co., Victor, gives the cost of mining, milling and cyaniding there: Thirty-three tons of ore per shift of eleven hours are treated with one engineer, one crusher feeder, one laborer in the vat and one solution man operating the plant. The cost of treating one ton of ore, including cost of oil, fuel (wood), cyanide of potassium, lime and zinc, is $1.09; 10 cents per ton more is chargeable for discharging the vat; total cost, $1.19; average cost of mining, $1.25 per ton; total cost per ton for mining, milling and cyaniding, $2.24. Ore carrying only $5 per ton can thus be worked at a profit.

The old Waterloo mine, at Daggett, is now being worked by leasers. Forty tons of ore are daily milled, giving twelve ozs. in silver per ton.

SHASTA COUNTY.

William McDermott, now in Butte, Mont., says that with A. H. Tarbet he has a new option on the Afterthought group, in which the proposition will pass up to them on the payment of $50,000. On this sum a cash payment of $5000, says Mr. McDermott, has now been made, the putting down of a 300-foot shaft with which to determine the continuity of the ore shoot to commence at once.

SIERRA COUNTY.

The Oriental Gold Mines Co. has levied an assessment of 10 cents per share, delinquent March 10.

The Orient Gold Placer M. Co. has levied an assessment of 25 cents per share, delinquent February 28.

SISKIYOU COUNTY.

Near Cecilville the Summerville Co. have a new sluice and resumed piping.

A. B. Colburn is building a mile of ditch that will carry 1000 inches of water.

The King Solomon mine has resumed. The company intend to enlarge their mill capacity from 50 to 200 tons per day.

The Black Bear mine is running steadily with plenty of ore in sight.

J. Stepens of Etna has bonded for a year the Plowboy copper mine. A shaft 140 feet has been sunk and a tunnel is being run.

Yreka Journal: A carload of machinery arrived in Yreka for the mining dredger building at Hawkinsville, in Yreka creek.

Grayson of Oakland, who bought a quartz mine at Know Nothing in the Salmon River country, has men developing it.

TRINITY COUNTY.

(Special Correspondence). — At the Brown Bear at Deadwood the main tunnel is in 2600 feet. The pay ledge is about 1400 feet farther. At the present rate at which the tunnel is going in, it will be reached in about 200 days. This tunnel will strike the ledge at about 850 feet below the lowest level of the mine at a total depth of nearly 900 feet. The works will, in all probability, be moved to the mouth of Thorn gulch when the pay ledge is encountered.

At Laughlins the Van Ness ledges are being developed. The Keno and Five Pines, owned by H. J. Van Ness, will be worked the coming season. In the Baboon ledge, owned by J. Wess Moore, $12.60 rock was struck.

French Gulch, Cal.

At the Chloride both mine and mill are running steadily. Development work is being pushed and good ore taken out and milled.

Journal: The stamp mill now being built on the Bullychoop and Occidental mines will be completed and in running order in about three weeks.

TUOLUMNE COUNTY.

(Special Correspondence).—One of the best 20-stamp mills in Tuolumne county is on the Gagnere mine at Tuttletown—a property owned by ex-U. S. Marshal W. G. Long and his family and superintended by his son, R. L. Long. The mill was erected two years ago, and at that time crushed ore taken from the Gagnere mine through the shaft of the Merritt, adjoining it on the north. A legal dispute arose over the title to the Merritt property, and the hoisting of ore for the mill through its shaft was discontinued. This necessitated closing down the mill, except for the limited working of custom ore, and it will be idle until the Gagnere can be opened through an independent shaft within its own limits. Such a shaft, with three compartments, and substantially timbered, is now being sunk on ground above the mill. At a depth of 180 feet the shaft will reach the old workings of the Gagnere, and ore extraction can begin. In the meantime, the Gagnere is preventing, at its own expense, the filling of the Merritt mine with water, doing it with water skips at the Merritt shaft. The Gagnere Co. has two parallel veins, each yielding milling ore. The mill and the air compressor will be run by water supplied by the Gale Ditch Co., under a fifty-year contract, with a fall of 274 feet at the mill and 330 feet at the air compressor. The mill has an eighty-light electric dynamo. Four additional concentrators are to be put in. The new railroad building from Jamestown to Angels will pass within a few hundred feet of the works. The Gagnere now employs twelve men, and is expected to find place for four times that number within the next few months. Jas. E. Gallagher is foreman.

The Arbona mine, near Tuttletown, is an active and promising property. Its equipment consists of a substantial Parke & Lacy steam hoist (capable of sinking to a depth of 1500 feet) and a 10-stamp mill. It is owned by Stockton men, and the policy of the company has been to develop the mine with the profits of the business rather than to declare dividends. Ore is taken from the second and fourth levels. The shaft is now down 523 feet. The ledge is from 3 to 8 feet in width. The company contemplates a canvas plant and chlorination works. Twelve men are employed, with J. R. Sears as Supt.

The Eleanor, or Street, mine is north of Tuttletown. It was known as the Schaw & Schollar mine, and is largely owned by Fred Sutton of Sonora, who now has it bonded to Hayes, Hinckley and Potter of San Francisco, and is being developed. The shaft is 200 feet on the old ledge, and a crosscut has been run which strikes a parallel vein carrying ore. Considerable ore has accumulated, and it is proposed to start up the 6-stamp mill, which is run by water supplied by the Tuolumne Water Co. There is a small cyanide plant below the mill. The ore runs strong in sulphurets of high grade. George Bowers is Supt.

Jackass hill, near Tuttletown, was famous for pocket mines. Its sides and crest are honeycombed with shafts and "coyote holes," most of which have yielded some wealth to the prospectors. At present thirty men are at work on this historic eminence. In one of the Gillis mines the persistent searchers for wealth are down 180 feet, which is about as deep as any shaft was ever sunk on the hill. The slate formation is traversed with narrow ledges of quartz and these ledges expand in spots to heavily mineralized chunks, from which quantities of free gold are taken. One pocket was thrown out by a blast a few years ago which yielded $45,000. Within the past two weeks pockets containing $2000 have been extracted. There seems to be a fascination about this style of mining which those who follow it are unable to resist. They prefer it to the large, low-grade propositions of the mother lode. James Gillis of Sonora, the original of Mark Twain's "Truthful James," is the principal owner of Jackass hill.

The Norwegian mine, on the north side of Jackass hill, has in the past been something of a "pocket" proposition. From late developments it looks as if this character is about to disappear. In developing the mine by crosscutting, a ledge of different character has been struck. The pocket ledge was in slate; the ledge recently found is quartz, carrying free gold. The crosscut tapped the latter ledge near the bottom of the 538-foot shaft, and extends to the surface. It looks as if this mine had entered upon a new era. The air compressor and hoist at the Norwegian are run by water. The mill started on the 1st. Sixteen men are employed here. R. O. Hoskin is Supt.

The Bown M. Co. is operating the Bown mine, located on the mother lode, one-half mile south of the Stanislaus river. The present company bonded the property in '98. At the hoisting works there is a double steam hoist, with gallows-frame 55 feet high. Down the hill is a 20-stamp mill, constructed upon modern principles. The mill has been idle for some time on account of scarcity of fuel, occasioned by impassable roads. The shaft is down 550 feet; sinking goes on. Twenty men are employed. W. J. Rule is Supt.

Tuttletown, Feb. 2.

The Boston News Bureau hears that a stockholders' meeting of the Santa Ysabel G. M. Co. will shortly be called and that stockholders are organizing "to protect their rights." The president, who had just returned to Boston from the property, was to make an official statement to directors this week.

The Densmore mine has been sold to H. G. Dodds for a sum in excess of $130,000, of which $20,000 was paid down.

Carters New Era: The Seminole G. M. Co. has bonded the Seminole mine to D. C. Mitchell of San Francisco. L. J. Safley will act as Supt. and Mgr.

YUBA COUNTY.

The Priestly dredger at Smartsville is about ready to start.

COLORADO.

ARAPAHOE COUNTY.

A smelter for the Dorsheimer interests is to be built at Wheatland, eight miles from Littleton, fourteen miles south of Denver. The Post says the Dorsheimers own large copper properties in Arizona, and will ship their copper to their Denver smelter. Copper matte has recently been imported from old Mexico by Pueblo and Leadville smelters. The Argo smelter at Denver has been using it, and thus will have a competitor in the Dorsheimer plant. The Omaha & Grant and the Globe smelters have the lead process, their product having to be refined after leaving the Denver plants, whereas the copper matte is reduced to bullion there and is accepted by the United States mints. The process treats gold with high percentage of copper, and a smelter using it is saved the cost of transportation of precious metals that must undergo refining.

BOULDER COUNTY.

The chlorination mill at Eldora is to be started up again this month.

CLEAR CREEK COUNTY.

Idaho Springs News: A 10 H. P. gasoline engine and hoister are being placed in the tunnel of the Specie Payment mine. F. Stansfield is Supt.

It is proposed to utilize power from Georgetown in operating the old Lamartine and neighboring mines.

DOLORES COUNTY.

Mining Investor: Dolores county added nearly $500,000 worth of precious metals to Colorado's output last year. Actual figures are: Gold, $97,000; silver, $270,000; lead, $27,500; copper, $20,000; total, $414,500.

EL PASO COUNTY.

The Anaconda G. M. Co. wants to borrow $50,000 for development work. D. H. Moffat is president. The report of the financial condition of the company and of its mining operations for the year is as follows:

From Jan. 1st, '99, to Dec. 31st, '99.

REVENUE.

Ore sales: 9,325.58 tons mill ore, average net value $7.35.	$ 68,598 33
21.37 tons smelter ore, average value $112.86	2,411 91
Total	$ 71,010 24
Royalty	32 91
Bills payable	64,000 00
Total	$135,043 15

EXPENDITURES.

Jan. 1st, '99, overdraft	$ 2,428 26
Permanent improvements	8,014 20
Operating expenses	122,164 39
Bills receivable	1,931 00
Dec. 31st, '99, bal. cash on hand	505 30
Total	$135,043 15

Balance sheet Dec. 31st, '99.

ASSETS.

Mines	$5,000,000 00
Property account (permanent improvements)	11,543 27
Bills receivable	1,931 00
Loss and gain, Dec. 31st, '99.	83,520 43
Dec. 31st, '99, bal. cash on hand	505 30
Total	$5,097,500 00

LIABILITIES.

Capital stock	$5,000,000 00
Bills payable	97,500 00
Total	$5,097,500 00

REPORT OF EXECUTIVE COMMITTEE—MINE WORKINGS.

	L'gth Dec. 31st, '98, Feet.	Work Done in '99, Feet.	L'gth Dec. 31st, '99, Feet.
Main tunnel	4,326	.....	4,326
Drifts	1,165	600	1,765
Crosscuts	4,847	445	5,292
Raises and winzes	2,080	320	2,400
First level above	330	530	860
Second level above	145	575	720
Third level above	570	50	620
Fourth level above	2,224	785	3,009
First level below	83	492	575
Second level below	620	300	920
Third level below—Station cut–Winze No. 1.			
Upper tunnel	614	.....	614
Drifts	140	.....	140
Crosscuts	.....	85	85
Raises and winzes	125	.....	125
Kittie M. shaft, depth.	425	50	475
First level	320	.....	320
Second level	110	.....	110
Third level	320	.....	320
Fourth level	283	.....	283
Fifth level	290	.....	290
Crosscuts	227	175	402
Raises and winzes	100	75	175
Excelsior shaft, depth.	100	123	223
First level	460	.....	460
Second level	.....	90	90
Crosscuts	.....	10	10
Leasers' work– Shafts	3,644	.....	3,644
Tunnels, drifts, etc.	3,230	.....	3,230
Totals	26,778	4,705	31,483

FREMONT COUNTY.

A new 500-ton chlorination reduction plant will be built at Florence, with W. B. Milliken of Cripple Creek as Mgr.

GILPIN COUNTY.

Illinois capital has started up the Old Town property, with G. K. Kimball of Idaho Springs as Mgr.

The Running lode near Black Hawk is employing fifteen men, all of whom are working on the tribute system. Shipments of concentrating ore are being made to the Rocky Mountain concentrator, which are giving fair results, and smelting ore which carries good values in lead is being shipped to the sampling works. This class of ore runs about $40 per ton.

LAKE COUNTY.

...(Special Correspondence).—The Morning Star group, under the management of E. D. Dickerman, is shipping from fifty to seventy-five tons per day of manganese ore from 90 to 500 feet depth. The work is all done under the tribute system.

Leadville, Feb. 5.

The Leadville Miner estimates the output of the Leadville mines for January at 85,000 tons.

About 175 tons of ore, values ranging from $6 to $20 per ton, are now being treated by the Boston Gold-Copper Smelting Co. by means of the Loder pyritic furnace.

The Maid of Erin lessees are mining fifty to seventy-five tons daily of crude zinc ore which goes to the Langon Works at Iola, Kansas.

Chronicle: Zinc-lead ore in considerable quantities is being sent from Lead-

ville to the American Zinc-Lead Works at Canyon City. Dr. Barthett, the manager and patentee of the process, pays for the gold, silver and lead, and uses the zinc in making paint. —Leadville mining men are discussing possibilities of wet processes as applied to the treatment of low-grade sulphide ores. In several mines experts estimate several million tons of such ore. The adoption of a wet process to separate the zinc, lead and iron is expected to successfully solve the problem. The first product of the tables is a lead concentrate with some iron and zinc. The tailings are run over another table, and what is saved is very heavy in iron, and with but little zinc or lead. The tailings represent the zinc product.

OURAY COUNTY.

The Blaine mine, near Ouray, is shut down, throwing forty miners out of employment. This and the closing of the Meldrum tunnel are locally attributed to "the Boer war."

C. Newman is in Ouray perfecting arrangements for a smelter at Ironton to treat low-grade ores there.

The tonnage produced in Ouray last year, notwithstanding the closing of several large mines temporarily, was much greater than during '98, and the values were almost trebled. The value of ore shipped was as follows: Gold, $2,250,000; silver, $910,000; copper, $127,300; lead, $122,000.

Post: At Ouray the American-Nettie will have a new 20-stamp mill and tramway. The tramway will be nearly a mile in lengh, the mine terminal being 1700 feet higher than the mill terminal. The longest span will be 1800 feet in length and have an elevation of 500 feet above the surface of the ground at the highest point. The stationary cable will be 1¼ inches; the endless cable will be 1 inch in diameter. The tram is automatic, the buckets being dumped without a man in attendance, and the ore is fed to the crusher by a hopper without any shovelers.

SAN JUAN COUNTY.

At Silverton the Sampson mill has begun to treat the ores of the American M. & T. Co.

At Silverton, the Iowa and Tiger Companies, two of the largest producers in the State, have consolidated.

TELLER COUNTY.

(Special Correspondence).—F. A. Walter, who has charge of the Blue Flag mine, on Raven hill, states that hoisting machinery will be put in, with the intention of working and shipping. A high-grade ore has been found at 118 feet depth. There are seven shafts on the group, and the showing near the surface is good.

Cripple Creek, Feb. 4.

(Special Correspondence). — Wilfley, Wood & Scobey of Denver have started their 100-ton concentration mill at Gillett, which is running on mill tailings.

Gillett, Feb. 5.

Work has been commenced on the new three-compartment shaft of the Portland, on Battle mountain. The shaft will be sunk to a depth of 1000 feet.

IDAHO.

ADA COUNTY.

The Rock Creek G. M. Co., capital $1,000,000, has organized. G. Mitten of Boise is agent.

BOISE COUNTY.

The Specimen G. M. Co., Ltd., has organized, capital $300,000, to operate in Boise county: principal place of business, Boise.

SHOSHONE COUNTY.

The Butte stockholders of the Consolidated Tiger-Poorman Co. have sold their stock for 49 cents per share. The total is about 250,000 shares, and this practically cleans up the stock of the old corporation and gives the New York company clear control of the mine.

Mullan Mirror: The Midnight tunnel is in over 200 feet. Two shifts are employed. The new tunnel is to be tapped at a depth of 500 feet.

MICHIGAN.

The Buffalo works of the Calumet & Hecla M. Co. say the company now has on hand at that place and ready for shipment 9,785,000 pounds of copper. The company is now working 267 drills in its mine.

MONTANA.

MADISON COUNTY.

The German Bar M. Co. has bought the Mollie Gibson dredger, near Laurin. The German Bar people have begun building a new boat near Junction.

The Pole creek placer mines are bonded to Montreal men and will be worked on an extensive scale.

PARK COUNTY.

G. O. Freeman, assignee of H. Bush, Mgr. Bush Con. M. & I. Co. of Jardine, has brought suit to recover $23,602.29 from the Bear Gulch M. Co., of the same place, alleged balance due the plaintiff for money advanced for the purchase of machinery, payment of wages and purchase of mines.

NEVADA.

LANDER COUNTY.

A. R. Holcombe has charge of the Copper Basin mines and has put men to work.

LINCOLN COUNTY.

I. W. Hawkins has sold to the Nevada & New England M. Co. a group of mining claims on the Nevada side, near the Homestake, for $20,000.

A cyanide plant of 150 tons capacity is to be put in at the Horseshoe mine.

STOREY COUNTY.

No more Con. California & Virginia ore, averaging in the mine car sample assays below $25 per ton, is to be sent to the Morgan mill for reduction, and in future all ore assaying under that value will be worked at the Kinkead mill, Virginia City.

NEW MEXICO.

BERNALILLO COUNTY.

Mgr. Posey of the Cochiti G. M. Co., Bland, reports the new treatment plant about ready to start. The old plant is producing $800 daily.

SANTA FE COUNTY.

Half a mile east of Dolores, F. P. Crichton has men at work on the building in which the Edison method of gold extraction is to be tested, at the head of the Arroyo Viejo.

UTAH.

SALT LAKE COUNTY.

The smelter of the United States M. Co. at Bingham is considered certain, Bostonians having agreed to buy $800,000 worth of first mortgage 7% gold bonds of the company.

The annual report of the Boston Con. of Bingham notes that the bodies of low-grade copper-bearing ore, with low cost of development and extraction, concentration and smelting, are expected to be the source of steady dividends. The management believes that a profit of $1 per ton can be derived from the copper-bearing porphyry now exposed. To determine the matter, Mgr. Newhouse has begun exploration of the ground by diamond core drills. He will continue exploring the high-grade copper sulphides already disclosed and block out the porphyry containing the low-grade ore, so that when the method of ore concentration has been decided on there will be a supply of ore for the concentration works. Thos. A. Edison has completed his examination and tests of a quantity of that ore, which was recently shipped him by a new process of his own, and which, if successful, will enable the company to make a greater saving of values, besides concentrating the ore at less cost. This process was described and illustrated in detail in the issue of April 30, '98. If Edison's experiments are satisfactory, it will enable the company to erect works at the mine, and the capacity of the works can be made to meet all the demands of the large body of that class of ore contained in the mines. Mr. Newhouse favors postponing the erection of the mill until Mr. Edison completes his tests. The milling department tests show that the tabulated results of the seven mill runs on the copper-bearing porphyry give a saving by concentration of an average of $3.10 per ton of crude ore based on an average price of 15 cents per pound for the copper contained in the concentrates produced. The average contents of the crude ore treated for these tests was 1.31% copper. The net profit to be derived from the concentration of this class of ore would be approximately as follows: Value per ton of crude ore saved by concentration, $3.10, less cost per ton of treatment mining, freight, smelting, etc., estimated at $1.50 to $1.75 per ton.

SUMMIT COUNTY.

Late arrangements at the Marsac mill at Park City, which will run on Ontario ore, ore thus described in the Record:

A large proportion of the ore passes the grizzlies and the remainder goes to a rock crusher of the Blake type situated on this floor.

The ore from the ore bins on the second floor is delivered to the rotary driers by belt elevators. These driers are also located on the second floor. Crude salt from Great Salt Lake is similarly delivered to these driers, and from the driers the ore is delivered by car to thirty stamps, and the salt to a 5-stamp battery.

The chloridized ore is piled on the cooling floor, where it remains for about two days before being transferred to the leaching department. From the cooling floor the ore is transferred to seventy-ton vats, seven in number, on the leaching floor where it undergoes treatment by the Russell process. These vats are 17 feet in diameter, 9 feet in depth and provided with canvas filter bottoms.

The capacity of the mill will range between sixty and seventy tons per day. The crushed ore, mixed with salt, is delivered by belt elevators to the Stetefeldt furnace. This furnace extends from the top of the building to the cooling floor, in which the ore is given a chloridizing roast. Producer gas is the fuel consumed in both the drying and roasting departments. This gas is manufactured in the mill from Rock Springs coal by partial combustion in a Taylor gas producer.

On the floor above the leaching vats are the chemical room and solution storage tanks. The chemicals used are hyposulphide of sodium, bluestone, soda ash, caustic soda and sulphur. The hyposulphide comes from Germany, the caustic soda and soda ash from Syracuse, N. Y., the sulphur from Nevada, while the bluestone is manufactured in the refinery here.

After the leaching process three products are obtained—lead carbonates, a mixture of base metal sulphides, and the regular sulphides, carrying the silver, gold and copper. The lead carbonates and base sulphides are shipped to the smelter and the regular sulphides are refined here.

All the products in preparation for shipment and refining pass through filter process, steam driers and pulverizers. Compressed air is used for agitating during precipitation and for elevating the leaching solution from the precipitation departments to the storage tanks, the stock solution being kept in constant circulation.

Tribune: The Ontario is working thirty stamps of the Marsac mill.

TOOELE COUNTY.

Material for the Mercur mill at Manning has been delivered.

Tribune: The deal between the Dalton & Lark M. Co. and P. T. Farnsworth, in which the latter undertakes the purchase of a large portion of the company's territory for $300,000, has been ratified by the shareholders.

WASHINGTON COUNTY.

Tribune: The sale of the Dixie group of copper mines, near St. George, is considered assured. The figure is $220,000.

SOUTH DAKOTA.

CUSTER COUNTY.

The shaft on the Grand Junction mine has reached a depth of 100 feet.

WASHINGTON.

FERRY COUNTY.

The mill for the Republic Con. M. Co. will be 253x315 feet, and will be terraced, as at the Golden Gate, in Mercur, Utah. On the upper tier there will be ore bins, capacity 800 tons, the crushing plant to be below. On the third tier will be three furnaces, capable of handling seventy-five tons; below will be the leaching tanks, 22 feet square by 6½ feet deep, with the solution tanks below them.

The Republic mine will build another 200-ton mill.

PIERCE COUNTY.

The Washington M. Co., on the Carbon river, near Fairfax, announce the discovery of chalcopyrite, assaying 10% copper.

WYOMING.

Work on the Kurtz-Chatterton, near Grand Encampment, is going on.

FOREIGN.

BRITISH COLUMBIA.

Premier Semlin of Victoria has answered the petition of the American miners in Atlin to President McKinley against the Alien Exclusion Act. He says the statements in the petition that four-fifths of the claims were prospected and located by Americans, and that citizens of the United States lost millions by the passage of the Act, are exaggerations and misstatements, and that any rights acquired by the petitioners have been preserved to them. He holds that men taking out miners' licenses did not acquire vested rights.

In a resume of results from '94 to '99, the Miner shows that in Rossland year by year the total values per ton of ore have decreased as the improved and cheapened methods of handling the mineralized rock have come into vogue. In '94 the value per ton was $40.69; in '95, $35.66; in '96, $32.66; in '97, $29.17; in '98, $22.20, and last year the values had fallen to $17.81. But, with every dollar of decrease, more and more ore came to be of marketable value. In '94 ore which contained less than two ounces of gold to the ton was not worth handling. The next year, despite the decrease of both copper and of silver, the amount of gold to the ton of the ore mined was just over 1½ ounces. In '96 the gold realized less than 1½ ounces. In '97 the proportion had dropped to 1⅓. The next year it had fallen to three-quarters of an ounce, and in '99 the percentage was just over 1½ ounces to the ton. The value set upon the gold in '94 was $16. In '96 and two following years the price given Rossland was $20, and in '95 and in '99, according to the abstract, the figure was but $19. In '94 the silver percentage was nearly 3 ounces to the ton, and the price averaged 60 cents per ounce. In '95 the percentage was 2½ ounces, the average price 57 cents. In '96, percentage 2⅓, value 56¾ cents; in '97, percentage 1⅞, nearly, value 59¾ cents; in '98, percentage 1½, value 55½ cents, and last year the percentage remained as in '98, but the average value obtained had increased to 62 cents. The figures showing the copper returns show noticeable results. While the total amount of copper per ton extracted from the ore has not varied very widely, yet the values have differed from year to year. In '94, 57½ pounds of copper to the ton, with an average price of 12 cents; in '95, 43 pounds, at 8¾ cents; '96, 41½ pounds, at 5 cents; '97, 26 pounds, at 4¾ cents; '98, 47 pounds, at 12 cents; '99, 43½ pounds, at 14 cents.

Gold in '94 formed 79% of the values of the total output. In '95, silver and copper both falling in the markets, its percentage rose to 85%. In '96, the same conditions continuing, it rose again to 89%. In '97, copper having about reached bottom and silver but slightly improved, it went to 93%. But in the following year, '98, copper got in and the percentage of gold fell to 70. Last year, copper still rising and the demand for silver being slightly accentuated, the percentage of gold to the other ores forming the value of the year's product fell to 61%. Copper began in '94 with a percentage of 17 of the gross output. By the next year, prices having fallen over 25%, the output of copper went down till its value only formed 11% of the total. The fall in the values continuing during the two following years, '96 and '97, the percentage first fell to 7 and then to 4. But, with the rise in copper, '98-'99, the percentage rose to 26 and finally to 34, forming slightly more than one-third of the value of the gross output.

A company has been formed and is about to incorporate in British Columbia to take over all his company's property. It will incorporate with a paid up capital of $500,000.

J. H. Patrick of the Caribou H. M. Co., on Quesnelle river, says that 120 whites and as many more Chinese and Japanese are employed during the working season. The face of the hill in which the gold is found is between 350 and 400 feet high, 120 yards wide at the bottom, and the pay streak is 120 feet thick. The water supply comes from two lakes, the larger nineteen miles away, the smaller ten miles away. Dams have been put in, raising the level of the lakes 8 feet and 45 feet respectively. The water is brought down to a point above the mine in ditches, whence it is run into two 30-inch pipes, contracting to 9 inches at the nozzle, with a fall of 420 feet. This head throws a 9-inch stream of water 300 feet before it sprays. The sluices are 7 feet wide, 5 in depth. Steel riffles are used in these sluices. The force of the water and rocks and earth dashing through the sluices wore off wooden blocks 1 foot thick every five days. The pay streak runs 25 cents to the ton. The last cleanup this season, thirty-three days, showed $100,000, or a little over $3000 a day of twenty-four hours.

The owners of the Velvet mine propose constructing a railway from Rossland to the mine. It has not yet been decided whether the motive power will be steam or electricity.

Rossland Miner: The output of the Hall Mines last year was 31,000 tons of ore. For the year ending on Sept. 30th the development work consisted of 2039 feet of drifting, 258 feet of sinking and 917 feet of upraises. Attention is now being mainly directed to the sinking of the big shaft.——The total amount of ore shipped from the Slocan from Jan. 1st, '99, to June 30th, '99, was 15,113 tons. From July 1st, '99, to Dec. 31st, '99, the shipments were 4310 tons.——J. C. Drewry, managing director Canadian Gold Fields Syndicate, Ltd., has bought the Commonwealth group, consisting of the Commonwealth, Republic and Sultan. They are silver-lead, the ore carrying grey copper.

A recent amendment to the mining law of British Columbia provides that the owners, agents or managers of every mine shall make yearly returns to the Bureau of Mines of the quantity of metal or ore wrought in their properties, and the number of persons employed above and below ground. The individual returns will not be published by the department without the consent of the owners, nor will the figures be available to the public save in the aggregate as given in the departmental publications, the information being intended for statistical purposes only. A maximum fine of $100 may be imposed for failure to comply with these regulations.

MEXICO.

The Calumet Mexican C. M. Co. of Chi-

huahua has organized in Denver, Colo., capital $100,000; P. F. A. Ryan, E. M. Basseck, L. D. Sweet.

The Compania Exploradora Sonorense has organized at Hermosillo, to prospect and develop Sonora mining properties; C. T. Von Petersdorf of Torres is Pres.; capital stock, $100,000.

THE KLONDIKE.

The name Klondike is generally used as a synonym for any part of the gold-bearing regions of western Canada and Alaska, while in fact it is the name of a comparatively insignificant river in British Northwest Territory. The Klondike gold district, strictly defined, embraces a portion of the drainage basins of the Klondike and Indian rivers, which enter the Yukon from the east near the sixty-fourth degree of latitude; the district thus probably includes an area of about 350 square miles. The Klondike is a shallow stream, flowing in a broad valley, and has a width of 100 yards at its mouth. There have been no surveys made of the entire river, but it is estimated to be about 120 miles long. For the first thirty miles of its course it is bounded on either side by hills of rounded outline and comparatively moderate relief; beyond this the river forks in a lowland, and the two most northerly forks rise in the foothills of the Rocky mountains. Terraces or benches are found on the Klondike and on its tributaries. Indian river is of smaller size, but has a similar character; and between these two rivers lies a mountain mass usually called The Dome. The Canadian geologists have not yet published the results of their investigations, but it is known that the bed rocks of the region are of schistose character, and they are probably of the same age as those farther west in Alaska, already described.

The important gold-producing creeks of the region, as far as now known, have their sources in The Dome. Those tributary to the Klondike flow in a northwesterly direction, while the tributaries of Indian river flow southwest. The pay streak lies on or near bedrock; the overlying deposit of gravel and fine material sometimes has a thickness of 40 feet. Bench as well as gulch claims are worked in the district.

Personal.

J. DYER, Mgr. Draper mine, Tuolumne county, Cal., is in Boston.

HORACE F. BROWN, M. E., of Chicago, is visiting Washington, Cal.

WM. P. DEWEY, formerly of San Francisco, is located in Denver, Colo.

J. A. QUALEY, Pres. Arizona Copper Smelting Co., is in Safford, Ariz.

LEO VON ROSENBERG of New York has returned to Los Angeles, Cal.

G. G. VIVIAN of Idaho Springs, Colo., has gone to Mexico to examine mines.

L. S. ROSE of San Francisco, Sec. La Suerte M. Co., is in Nevada City, Cal.

W. C. D. BODY is building a 20-stamp mill for the Standard M. Co. at Newcastle, Cal.

JOHN HERRON, Supt. Tomboy mine at Telluride, Colo., has returned from New York.

PERRY HALL, former foreman Junction mine, Soulsbyville, Cal., is visiting that locality.

S. F. PARRISH of Leadville, Colo., has taken charge of his British Columbia property.

JAS. CRONAN, late Supt. Zala M. M. Co., in Sheridan camp, Wash., is succeeded by D. M. Snyder.

F. A. C. PERRINE has resigned the professorship of electrical engineering in Stanford University, Cal.

L. A. SCOWDEN, a Junction City, Trinity county, Cal., mine operator, has returned from San Francisco.

SUPT. DOBLER of the Brown Bear mine, Deadwood, Cal., has returned to his mine from a business visit to San Fransisco.

D. E. BIGELOW of the Union Iron Works is in Weaver, Ariz., where he will erect a large plant for the Octave M. Co.

EBEN SMITH of Colorado is visiting Eureka, Utah, and after examining the Victor Jr. placer property in southern Oregon will visit California.

B. F. HALDEMAN is succeeded in the superintendency of the Bessemer department of the Cambria Steel Co., Johnstown, Pa., by W. C. C. Geer.

S. PENROSE, Sec., and C. McNeill, Mgr., of the Colorado-Philadelphia Reduction Co. of Colorado City, have recently visited Deadwood, S. D., where they have mining interests.

SUPT. J. B. HOBSON of the Cariboo mine, Quesnelle Forks, B. C., states that construction work is now finished and that next year the mine will be run full time on good gravel, and that there should be, under ordinary circumstances, 2,000,000 yards of gravel washed. He says the average of the channel gravel is about 21 cents per yard. The total expenditures on his mine to date amount to $1,200,000; total output, $520,000.

MARCUS DALY denies the statement that G. M. Hyams succeeds him in the presidency of the Amalgamated Copper Co. Mr. Daly's term of service with the Amalgamated Co. will not expire until next May.

BEN WILLIAMS, late of the Copper Queen, Arizona, has returned from a quest for copper in British Columbia. He and his brother, Lewis, are about to engage in mining operations on an extensive scale in California.

COMMISSIONER HERMANN of the General Land Office says that, in the matter of persons living on forest reserves making proof and obtaining title for their land, there is no general law on the subject, but the ruling of the Department had been and is now that, if the person had gone in before the President's proclamation setting aside the land as a public reserve, he could, at the end of five years' residence thereon, go into the nearest land office and prove up his land and get title for the same.

Industrial Notes.

—Nelson, B. C., is to have a smelter and lead pipe factory.

—The Sierra Railway Co. are running trains from Jamestown to Carters, Cal.

—Nearly 2000 men are at work on the coast railroad line at Gaviota and Santa Barbara, Cal.

—The Northern Pacific Railway Co. has bought the Everett & Monte Cristo, Wash., Railway.

—The Old Colony Trust Co. of Massachusetts is filing in California counties a $2,500,000 mortgage on the Sunset T. & T. Co.

—During January there were seventy-two oil companies organized in California with an aggregate capitalization of $17,025,000.

—A German publication states that the Philippine islands are among the few places where gutta percha trees will flourish, and suggests the cultivation of the trees as an opportunity for American enterprise.

—Colorado telephone people are extending their lines from Salt Lake toward Grand Junction. They have a local line between Grand Junction and Palisade, and one from Denver to a point near Glenwood springs.

—The Canadian Pacific has let a contract for construction of its Balfour extension and work has begun. It will cost about $500,000. It extends from Balfour, on Kootenay lake, to Five Mile Point, five miles west of Nelson, British Columbia.

—The Dawson City Water Works, over the hydrant of each customer, who pays $1 per week for the service, erects a wooden house measuring 6 feet in all three dimensions, each of which contains a stove in which the company keeps a constant fire.

—The Bellingham Bay & British Columbia Railroad have placed a $1,000,000 trust mortgage on their line of railroad from Whatcom to Sumas, Wash., to secure an issuance of bonds of that amount. The Bank of California is the mortgagee.

—Near Santa Cruz, Cal., the Big Creek electric plant is bought by F. W. Billing and J. F. Packard of Utah for $250,000, who intend to construct a duplicate pole line from Santa Cruz to Big Creek and raise the dam 10 feet, making it 40 feet high.

—A bill now under consideration by the Committee of the Senate on Public Lands provides that the State School of Mines at Golden, Colo., shall annually receive 25% of all moneys paid to the United States for mineral lands within the State of Colorado. It is stipulated that this sum shall not exceed $12,000 in any one year, nor shall it exceed the amount of money expended by the State for the school.

—The Division of Forestry will continue the investigation of Pacific coast timber begun last summer, and several parties will start in June for the redwood belt of California and the fir forests of Washington. The object is to compare the reproduction with the present depletion and to investigate the possibility of reforesting logged-off lands. There will be from fifteen to twenty-five men in each State.

—Much attention is being given at present to timber lands. Lumber companies are paying good prices for stumpage and a large amount of capital is looking for good timber within reasonable haulage distances. Timber claims are being hunted up in Oregon and Washington particularly, and many mineral prospectors have utilized their time during the snowy months of the winter in a search for good timber.

—At San Bernardino, Cal., in the Santa Fe shops are installed air compressors, the air being piped to all parts of the yard. When a "dead" engine is to be moved a hose is attached to an air plug and to a three-way stop cock that opens into the boilers just above the cylinders. The boiler is filled with air till the dial in the cab registers seventy-five pounds pressure. This air is then admitted to the cylinders, and one filling of the boilers is sufficient to drive the locomotive from the back shop into the roundhouse. In the olden days this would have necessitated a large force of men with pinch bars to get the engine off the pit and onto the track. There a switch engine would have pushed it up to a turntable and again the pinch bars would have come into play to put the engine in the stall. It frequently took ten men half a day to do the work air now does in fifteen mieutes.

—American commerce with the islands and countries of the Pacific shows a greater gain in the year 1899 than that with any other part of the world. Our total exports increased $20,000,000, and our exports to Asia and Oceania alone increased over $19,000,000. Our total imports increased $164,000,000, and $48,000,000 of this increase was from Asia and Oceania. Exports to Asia and Oceania increased 27%, while imports from that part of the world increased 40%. Of this increase of $20,000,000 in exports to Asia and Oceania, over $6,000,000 went to British Australasia, $4,000,000 to the Hawaiian Islands, $4,000,000 to China, and the remainder distributed to the various countries and islands of that part of the Western Pacific, while of the imports from Asia and Oceania $12,000,000 were from the Dutch East Indies, $11,000,000 from Japan, $9,000,000 from the British East Indies, $7,000,000 from China, and $6,000,000 from Hawaii.

—The Oakland, Cal., Enquirer notes the considerable income or earning capacity of a Pullman car. Every road in the United States pays 3 cents per mile for the privilege of hauling a Pullman car, and contracts to return it in as good a shape as it was received and to pay for all damages. The journey on the Owl train from the Oakland mole to Los Angeles, Cal., is 428 miles. On this there are generally two Pullman sleepers. The money paid, therefore, for the use of the two cars for one trip to Los Angeles is $25.68. If the cars are full, as is generally the case, the receipts from berths, sections and staterooms amounts to $185 per car or $370 for the two cars, making a total revenue of $395.68 per day. Out of this must come the wages of the porter and conductor, the cost of towels, sheets, soap, etc., the whole amounting to but a small sum, considering the revenue. Then there is the wear and tear and general depreciation, the daily refitting and repairing. Set these charges down at 10%, and give the car but five trips per week to Los Angeles, then the earning would be $46,294.56 per year.

Commercial Paragraphs.

THE Weigele Pipe Works, Denver, Colo., report orders booked for two pipe lines, aggregating a mile of pipe, for the development of water power in Colorado.

DRAPER & MCLEOD, assayers, have moved into new headquarters at 1736 Champa street, Denver, Colo. Both are graduates of the Colorado School of Mines.

THE General Electric Co. has a contract from the Sao Paulo Tramway, Light & Power Co. of Sao Paulo, Brazil, for a large high tension power transmission plant, to cost about $200,000.

THE assaying establishment of Abbot A. Hanks will be removed on the 1st prox. from 718 Montgomery street to more commodious quarters on the ground floor at 531 California street, San Francisco.

THE Denver Engineering Works, Denver, Colo., has an order for two silver-lead smelting furnaces for the Germania and Mingo smelting plants at Salt Lake City, Utah, and a set of crushing rolls for the sampling plant for the Globe, Arizona, smelter.

THE Jeanesville Iron Works Co., Denver branch, A. Middlebrook Mgr., report recent sales of two steam station pumps to a coal company; two electric power station pumps to another coal company; one high lift station pump to Leadville; two No. 7 sinkers to local dealers. The factory has an order from a Missouri lead mine for a large compound pump, long stroke.

Catalogues Received.

Catalogue No. 21 of the Hallidie Wire Ropeway, manufactured by the California Wire Works, San Francisco, gives some fine illustrations and good description of this form of aerial tramway. The newest thing in this line is the center clip, patented May 9th, '99, made in halves and drop-forged; an ingenious device. Profiles, blank estimate of cost, etc., accompany the pamphlet, which contains much valuable, up-to-date information on the subject.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING JAN. 30, 1900.

642,202.—AMALGAMATOR—J. L. Bradbury, S. F.

642,080.—ANIMAL EXTERMINATOR—F. Burman, Fortuna, Cal.

642,132.—TRACTION WHEEL—I. S. Kimbrell, Somis, Cal.

642,236.—CLASP—Fannie C. Larimer, Los Angeles, Cal.

642,243.—BEER FAUCET COOLER—Moran & Hoey, S. F.

642,474.—OVERSHOE—C. Moser, Fruitvale, Cal.

642,255.—TRAVELING CABLE GRIP—E. I. Parsons, S. F.

642,566.—SET SQUARE AND BEVEL—A. C. Smith, Los Angeles, Cal.

642,502.—SAWING MACHINE—Spencer & Neal, Sisson, Cal.

642,177.—FRUIT DRIER—E. Thompson, Pasadena, Cal.

32,172.—DESIGN—A. C. Ambruster, Los Angeles, Cal.

32,178.—DESIGN—W. W. Flewelling, Selma, Cal.

32,177.—DESIGN—M. Schichtl, North Yakima, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BEER FAUCET COOLER.—J. Moran and R. P. Hoey of San Francisco, Cal. No. 642,243. Dated Jan. 30, 1900. The object of this invention is to provide a means for cooling beer and like liquids while they are being drawn from the cask or containing vessel. It consists of a segmental, double-walled refrigerating casing having holes made through it at points between the upper and lower walls, and in line with the hole into which the faucet has to be driven, so that the faucet passes through the enclosed space of the chamber, and in direct contact on all sides with the refrigerating material. Swinging plates fit over the holes and are adapted to enclose the faucet after it has been inserted, and means are provided for securing it against the head of the cask.

TRAVELING CABLE GRIP.—E. I. Parsons, San Francisco, Cal. No. 642,255. Dated Jan. 30, 1900. This invention consists of a grip which is especially applicable for aerial traveling ropeways, in which the load is suspended from trolleys traveling upon a stationary cable, and moved by means of a grip connected with the trolley frame and adapted to be closed upon a traveling cable. The device consists of a slidable hanger guided by the framework of the supporting trolleys, a fixed gripping jaw carried by the hanger, a movable jaw carrying the screw-threaded nut, a screw journaled and turnable through the nut, and a rocker arm connected with the screw shaft, connections being made between the rocker arm and the sliding body and a traction cable which is adapted to be locked between these jaws. In conjunction with this are fixed rails at points where the rollers may be received, so as to transfer the weight of the load from the main supporting cable at points where the apparatus is to stop for any purpose.

Recently Declared Mining Dividends.

Franklin, Michigan, M. Co., 3%; Feb. 10.

Bunker Hill & Sullivan M. & C. Co., $21,000; Feb. 5.

Boston Get There Zinc Co., monthly dividend 1%; Feb. 10.

Swansea M. Co., Utah, 5 cents a share, $5000; payable Feb. 15.

Daly-West, Utah, 25 cents a share, $37,500; payable Feb. 20.

Empire State Idaho M. & D. Co., monthly dividend, 3%; payable Feb. 15.

Montana Ore Purchasing Co., quarterly dividend, $1 per share; payable Feb. 15.

International Silver Co., New York, 1¾% on its preferred stock; payable April 1.

Cordell Zinc & Lead M. Co. of Missouri, monthly dividend, 5 cents per share; payable Feb. 15.

Latest Market Reports.

SAN FRANCISCO, Feb. 8, 1900.

SILVER—Per oz., Troy: London, 27¾d (standard ounce, 925 fine); New York, bar silver, 59½ cts. (1000 fine); San Francisco, 59½; Mexican dollars, 48c.

COPPER.—New York: Lake, 1 to 3 casks, 16.75 cash; carload lots, 16½; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.00; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17½@18. Mill copper plates, 23½c; bars, 25½@27c.

Morrison, Kekewich & Co. of London say: "It would appear that American consumption increased 45½% during 1899. We think that prices will be maintained at a high level for many months to come. Consumption promises to be on an enormous scale."

LEAD.—New York, $4.70; St. Louis, $4.70; San Francisco, $4.85; pipe 7½, sheet 8½, bar 6½c. London, Soft Spanish Lead, £16 11s 3d=4.73c per lb.

SPELTER. — New York, $4.70; St. Louis, $4.70; San Francisco, ton lots, 6c; 100-lb lots, 6¼c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 10c; 300 to 500 lbs., 11@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, 10c.

IRON. — Pittsburg, American soft, $25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c.

STEEL.—San Francisco, bar, 12c to 20c per lb.

QUICKSILVER. — New York, $52.00; London, £9 14s; San Francisco, local, $51.50 ₱ flask of 76½ lbs.; export, $47.50.

PLATINUM.—San Francisco, crude, $16 ₱ oz.; manufactured, $19@22.

FERRO-MANGANESE. — San Francisco, ₱ ton, $30.

ZINC.—San Francisco, 5¾; slab, 6½c; bar, 8.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb.

TIN.—New York, pig, $28.50; San Francisco, $30; bar tin, ₱ lb, 35c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 40c to 50c.

NICKEL.—New York, 40@45c ₱ lb.

BISMUTH.—New York, ₱ lb., $1.80 50-lb lots; San Francisco, $2.50 to $3 lb lots.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ₱ set; 14 oz., 40s., 11c.

FERRO-TUNGSTEN.—New York, 60c; San Francisco, 75c (60%).

MAGNESIUM.—New York, $3.50 ₱ lb.; San Francisco, $4.50.

TUNGSTEN.—New York, ₱ lb., 75c; San Francisco, 90c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs' $10.05; Colorado Anthracite, $14.50.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 34@36c ₱ lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, 1¾c ₱ lb. 66° B; soda ash, $1.60 ₱ 100 lbs. 58%; hyposulphite of soda, 2½@3c ₱ lb.; blue vitriol, 5½@6c ₱ lb.; borax, concentrated, 7@8c ₱ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1½@2c; nitric acid, in carboys, 8c ₱ lb.; caustic soda, in drums, 3@4c ₱ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ₱ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, strictly pure, boiled, bbl., 68c; cs., 73c; raw, bbl., 66c; cs., 70c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 55c; cs., 60c; No. 1 bbl., 45c; cs., 50c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 65c; No. 1 bbl., 52½c; cs., 57½c.

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 8, 1900.

9:30 A. M. SESSION.

300 Mexican.....29c	100 Sierra Nev..39c
200 B. & B.....36c	1000 Overman...4c
100 C. C. & V.$1 45	400 Caledonia...34c
100.....$1 40	50 Standard. $2 75

2:30 P. M. SESSION.

300 Ophir 68c	200 Alpha..... 3c
200 Mexican.....28c	200 Sierra Nev'a.45c
100 C. C. & V.$1 45	100 .....46c
400 Chollar 20c	300 Utah.....04c
500 Potosi 25c	

UTAH and CALIFORNIA

Are two of the most magnetic names in the roll of States, and the best way to reach them is over the Rio Grande Western Railway, "Great Salt Lake Route." As the name intimates, the Rio Grande Western is the only line that passes directly through Salt Lake City on the way to California; and Salt Lake City and the Great Salt Lake are the two points which should certainly not be missed on your western trip, as they contain more interest to the average American than any two other points within the confines of the United States. Study the matter carefully and you will choose the Rio Grande Western for this reason as well as for the magnificent scenery, superb equipment and fast time. It is the popular route during the winter as in summer. Write to GEO. W. HEINTZ, General Passenger Agent, Salt Lake City, for particulars.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

Wealth Producers.

Copper mining has been more profitable than any other business undertaking.

STATISTICS SHOW THE GREAT RESULTS. WRITE FOR PAMPHLET.

COLONIAL COPPER COMPANY, 32 Broadway, N. Y.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO., ASSAYERS AND WASTE PRODUCT SMELTERS, 1661 Larimer St., Denver, Colo.

Write for Donaldson's Assayers' Slag Hammer.

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Wanted.—Experienced Metallurgist and Assayer.

A practical as well as theoretical knowledge of the treatment of ores by all the principal methods necessary. Address W, Mining and Scientific Press.

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In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated Mines, a meeting of the Stockholders of this Company will be held at 11 o'clock in the forenoon on Tuesday, the 27th day of February, 1900, at its principal office, 320 Sansome St., room 24, San Francisco, California, to consider and vote upon the proposition to increase the Capital Stock of this Company to four hundred thousand ($400,000) dollars in 400,000 shares at the par value of One Dollar each.

JOSEPH H. MOOSER, Secretary.

Dated San Francisco, January 15th, 1900.

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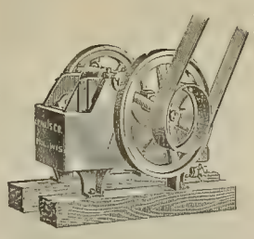
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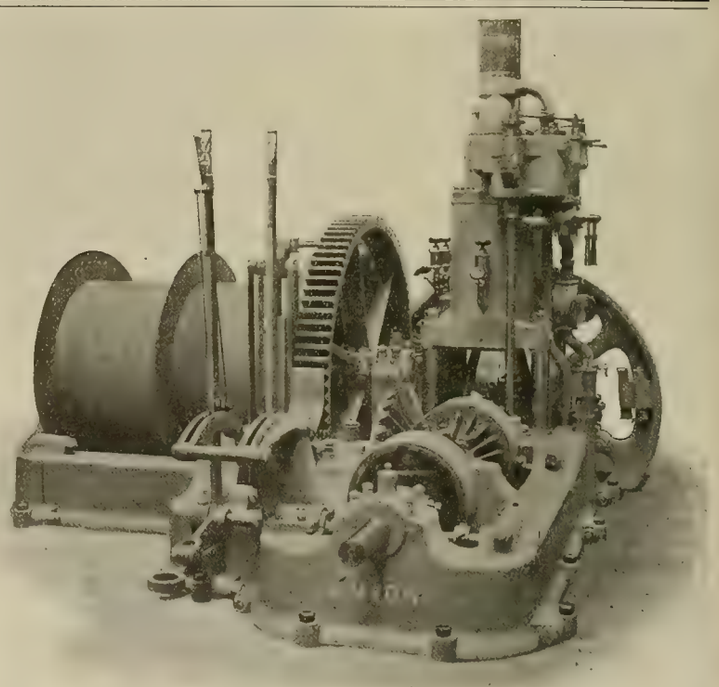
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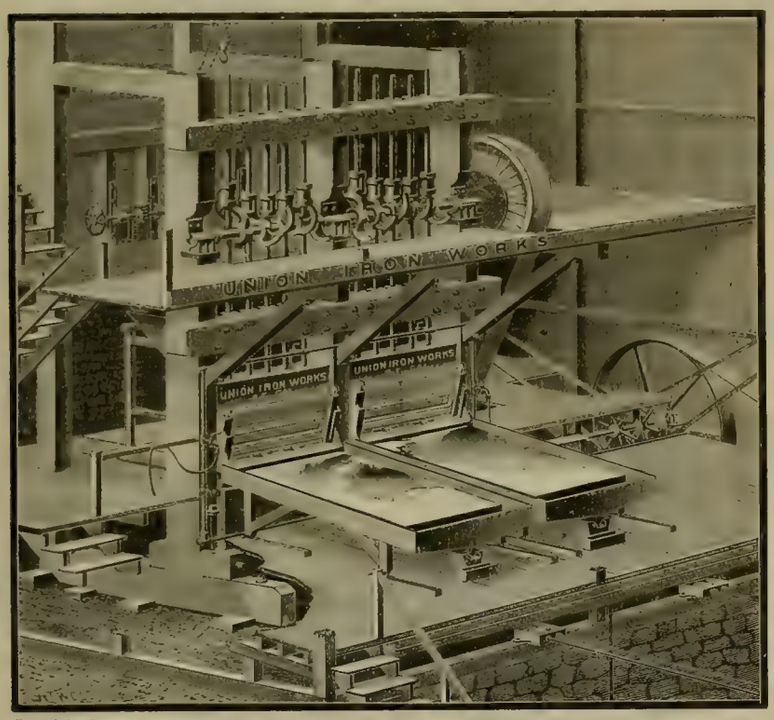
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MODERN TEN-STAMP BATTERY.



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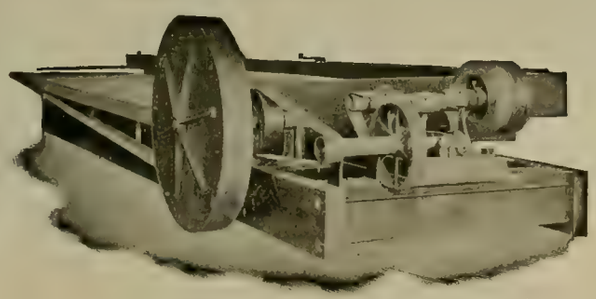
The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

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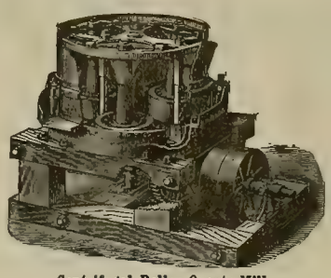
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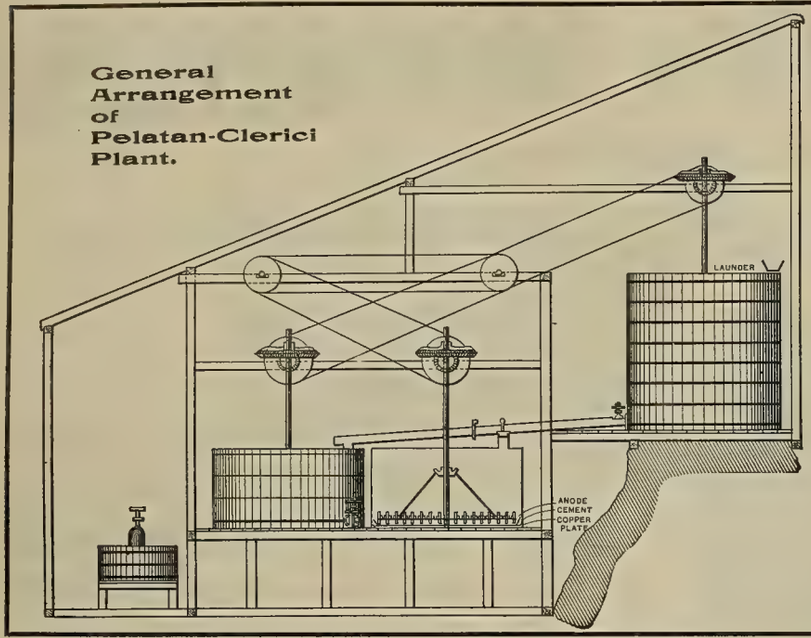
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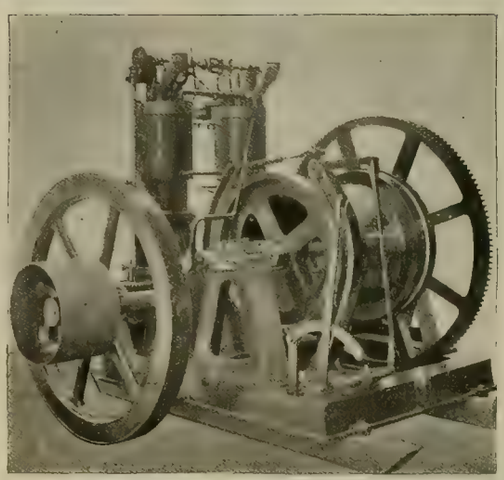
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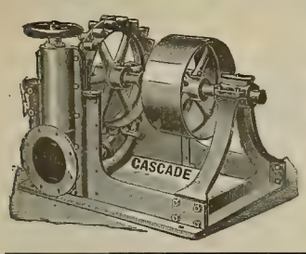
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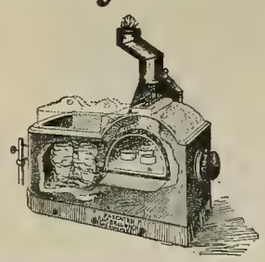
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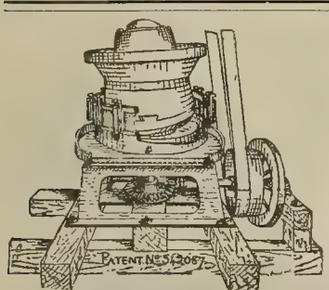
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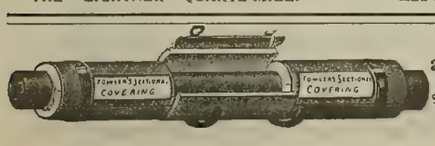
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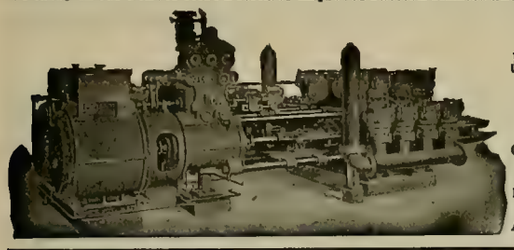
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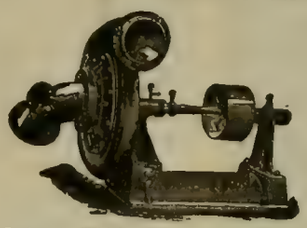
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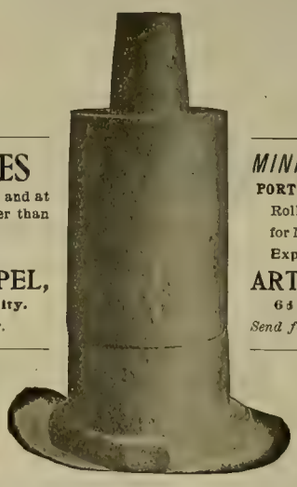
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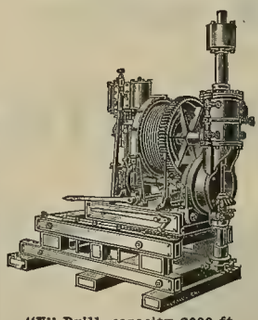
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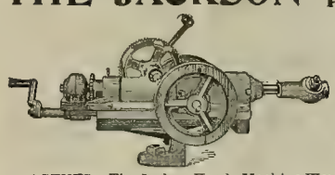
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Name.	No Cert.	No. Shares.	Amt.
Alfred Burns	50	100	$40 00
Mrs. F. G. Brown	73	300	120 00
Frances Camille Berthiaume	109	1,850	740 00
Frances Camil e Berthiaume	110	2,000	800 00
Mrs E. J. Cadwallader	15	800	320 00
P. Crowley	101	250	100 00
R. R. Grayson	65	1,000	400 00
Alice B. Munroe	20	100	40 00
James W. Gradorff	22	50	20 00
Warren Olney	82	100	40 00
Thomas Quigley, Trustee	104	1,000	400 00
W. C. Ralsto	89	1,000	400 00
W. C. Ralston, Trustee	52	1,000	400 00
W. C. Ralston, Trustee	53	1,000	400 00
James Simpson	102	750	300 00
John Young	12	200	80 00
		11,500	$4,600 00

And in accordance with law, and an order from the Board of Directors, made on the 2nd day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, No. 439 California street, San Francisco, California, on MONDAY, the 5th day of March, 1900, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

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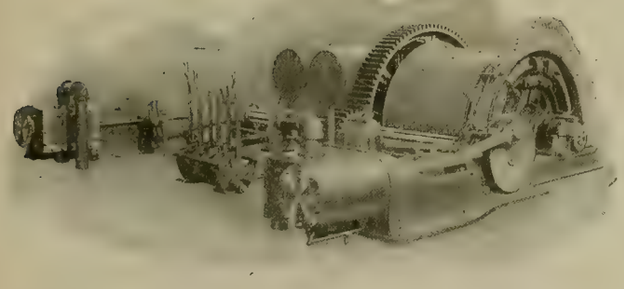
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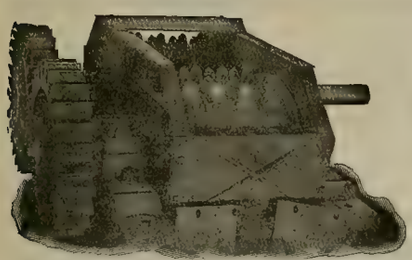
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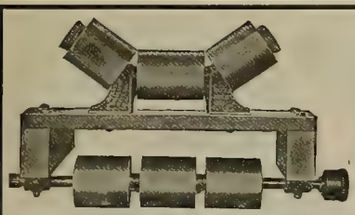


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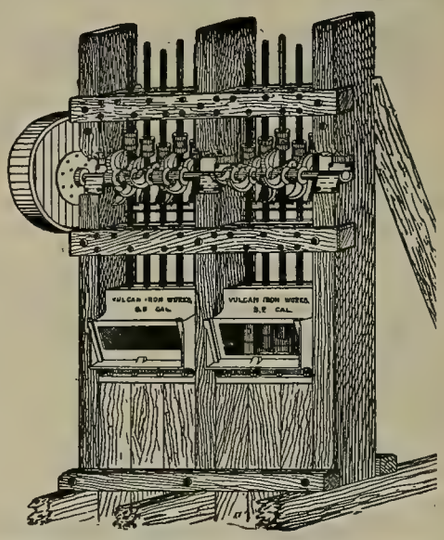
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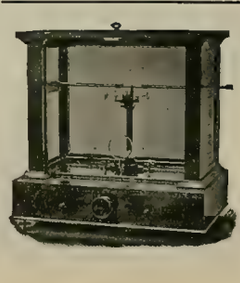
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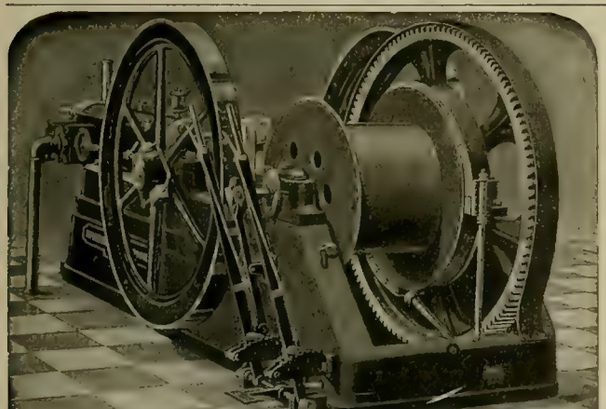
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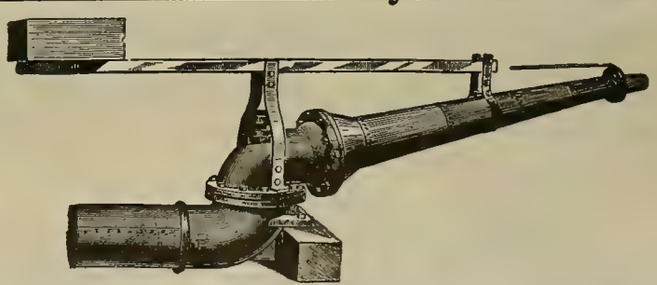
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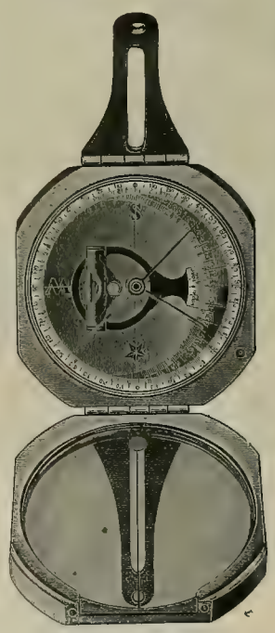
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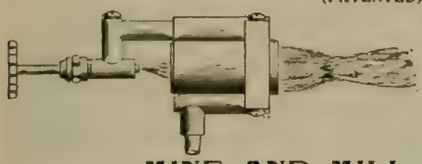
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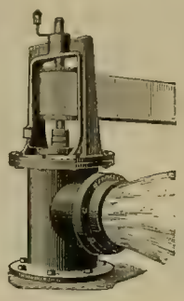
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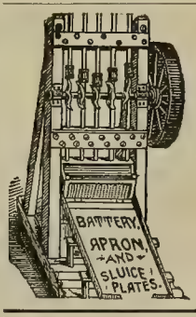
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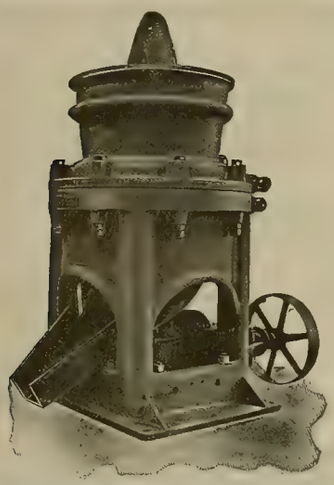
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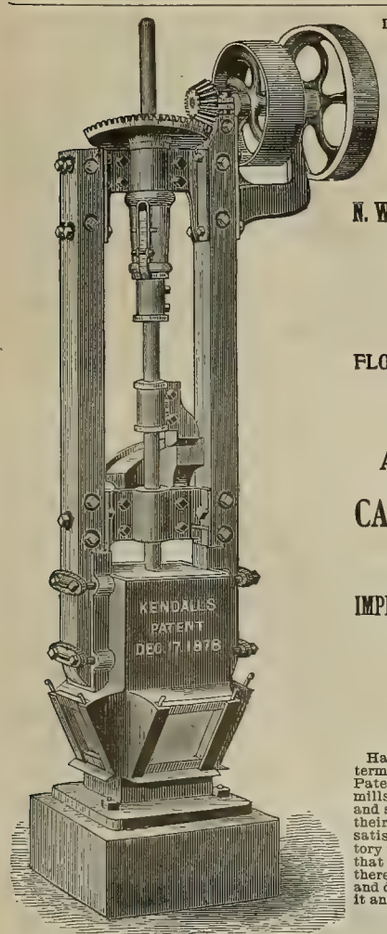
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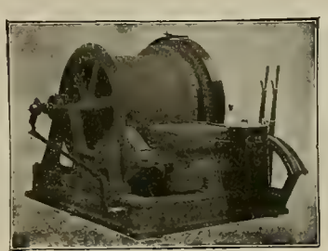
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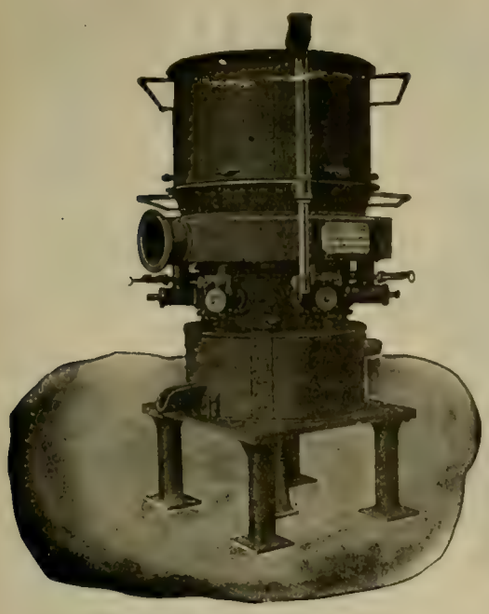
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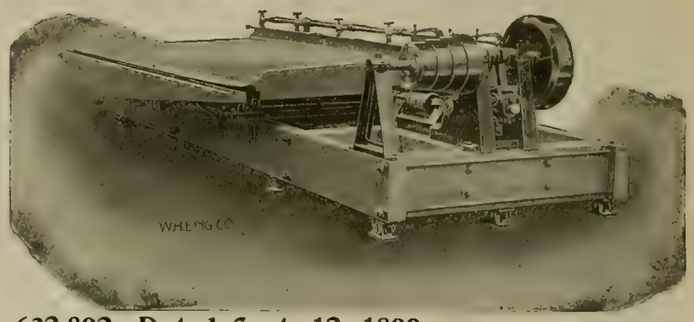
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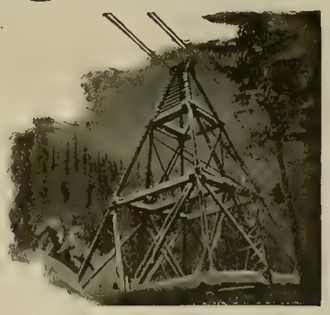
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Any stock upon which this assessment shall remain unpaid on the 27th day of February, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 19th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1900, an assessment (No. 2) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of March, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, room 36, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 15) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of March, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 118) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on Tuesday, the 13th day of March, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of April, 1900, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 14) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 9, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of March, 1900, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 9th day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary

Office—320 Sansome street, room 9, San Francisco, California.

DELINQUENT SALE NOTICE.

MAY DAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 29th day of November, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Fanny Mayblum	61	50	$5 00
J. P. E. Heintz	57	1,000	100 00
J. P. E. Heintz	116	125	12 50
J. P. E. Heintz	129	4,000	400 00
J. P. E. Heintz	134	500	50 00
J. P. E. Heintz	135	200	20 00
Wm. A. Junker	71	500	50 00
Annie D. Weeks	133	500	50 00
C. G. von Treutler	127	400	40 00

And in accordance with law, and an order from the Board of Directors, made on the 29th day of November, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, Heald's Business College, 24 Post street, San Francisco, California, on TUESDAY, the 20th day of February, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

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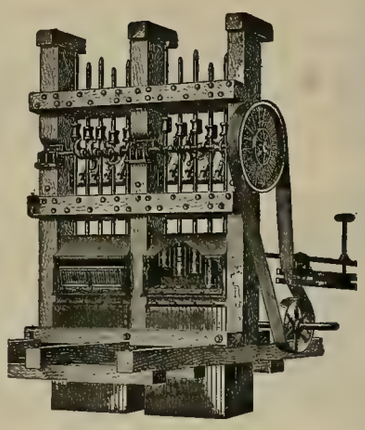
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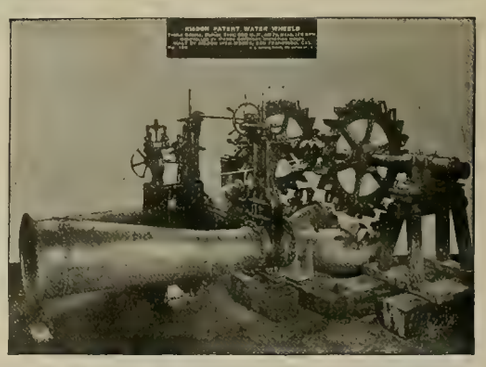
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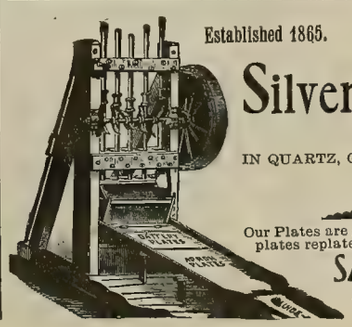
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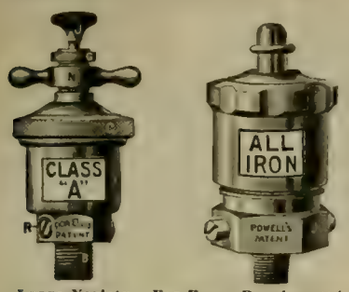
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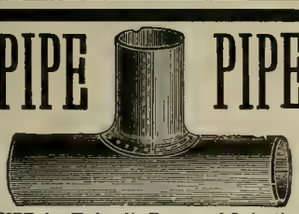
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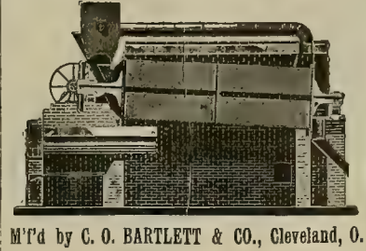
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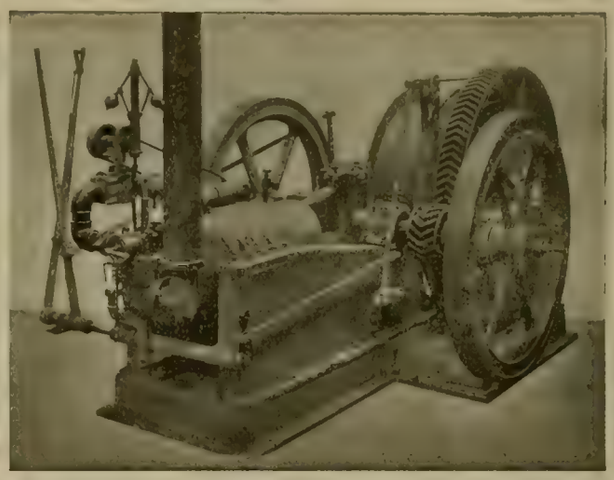
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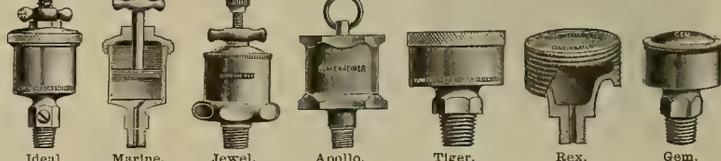
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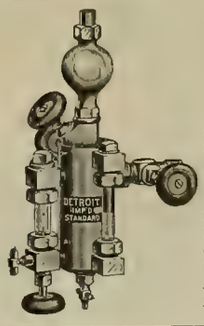
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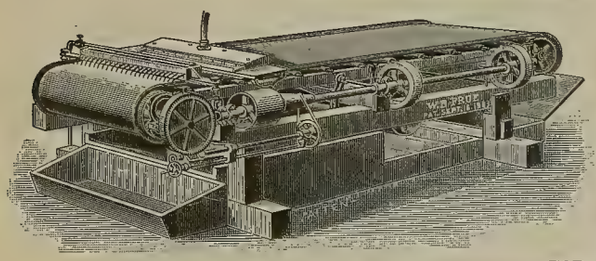


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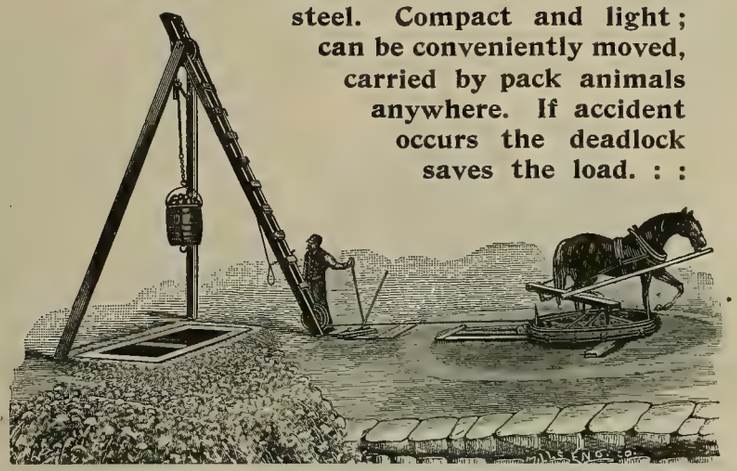
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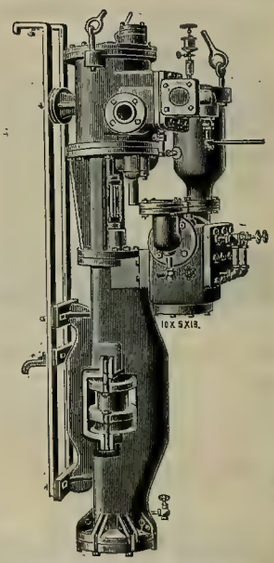
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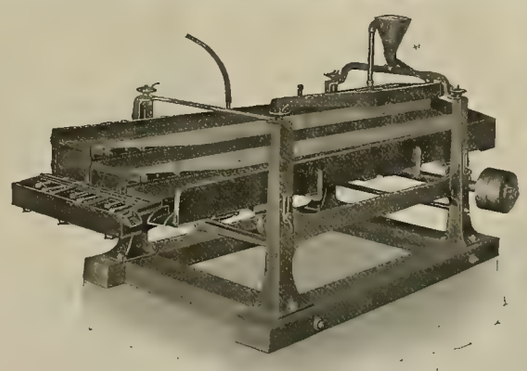
Separates ALL the minerals from each other at one operation.
Gives THREE CONCENTRATES on the one Machine at the same operation.
The Machine is especially adapted to the separation of Zinc and Lead.

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SHIPPING WEIGHT - - - - - 2200 POUNDS.

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No. 2067.—VOLUME LXXX. Number 7. SAN FRANCISCO, SATURDAY, FEBRUARY 17, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Gold Mining in the High Sierras.

The accompanying illustrations portray one of the highest gold mines in the United States. One picture shows the western wall of Lake canyon on the eastern slope of the Sierra Nevadas, in Mono Co., Cal. Near the summit of this rocky slope, at an elevation of 11,000 feet, lies the May Lundy and associated claims. The location of the boarding house and men's quarters is marked by a dark cross. The buildings can be dimly seen in the picture.

The mill is situated in the foreground, fully 1000 feet lower than the lowest workings and near the bottom of the canyon. The ore is delivered to the mill by means of a wire tramway, so that there is no interference from the snow, which lies here more than six months of the year.

Mount Scowdan, the eastern face of which forms the steep canyon wall, rises to a height of about 12,000 feet and is thoroughly seamed with quartz veins. The formation is generally granite, though toward the west metamorphic rocks appear.

Lake canyon is so named from a series of glacial lakes occupying rock basins. Two miles below the mill the canyon opens into Mill Creek canyon, not by a gentle grade but by a very abrupt descent of fully 1000 feet.

The scenery in Mill Creek canyon is also wild and grand in the extreme, as the accompanying illustration shows. At the far end of the lake lies the little mining town of Lundy, supported by the numerous claims about Mount Scowdan.



Looking Up Mill Creek, Mt. Scowdan on Left, Mono Co., Cal.



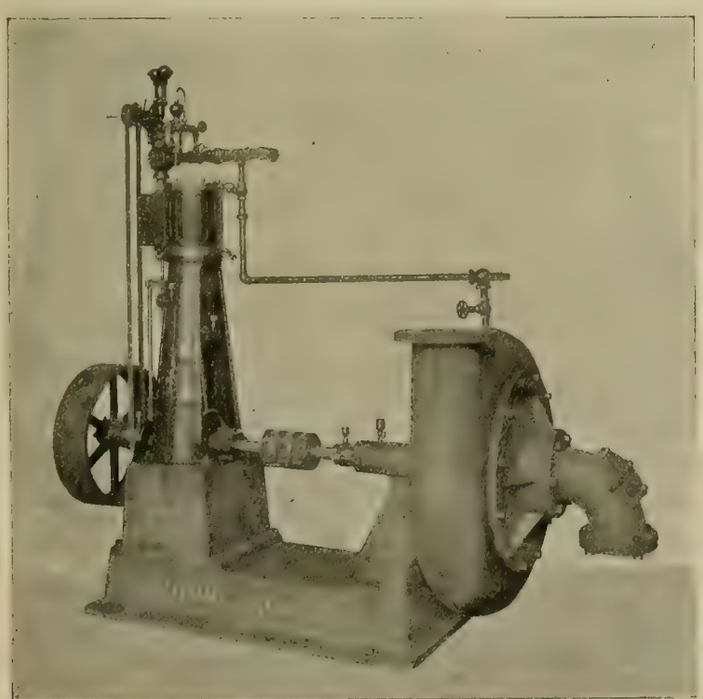
May Lundy Mill, Mono Co., Cal.

Pumping Plant for Cape Nome.

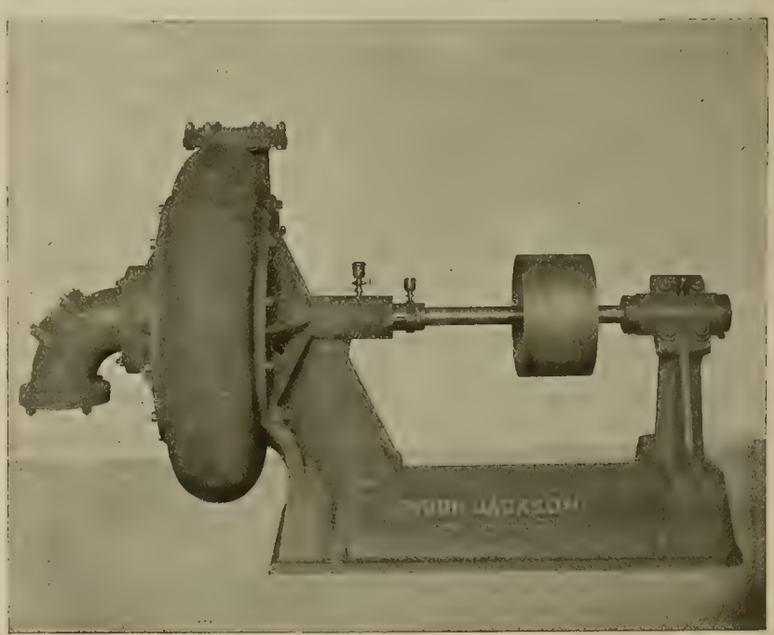
Cape Nome beach claims lie below high tide, being occupied and worked only under locally arranged conditions. Tundra claims include all those lying above the beach claims. Many of these are removed from the shore lines, located along the creeks or gulches, and for the most part dry. In all these mines a primary necessity is water and for almost all of them the water must be raised artificially by means of pumps.

Light pumping plants seem adapted to the requirements of the Cape Nome district; in many cases it is not only required to raise the water, but also the gold-bearing sand and gravel into the sluice boxes. The Byron Jackson Machine Works, of San Francisco, are constructing specially designed pumps and machinery to handle the entire material. Herewith appears a cut of their 6-inch sand and gravel pump arranged to be driven by belt from a steam or oil engine, built to handle solid matter up to 6 inches in size, and to discharge 25% of its capacity in sand or gravel. This would represent an ability to raise twenty tons of gravel per hour, and at the same time 90,000 gallons of water. This type of pump is reported as having been successfully used in other mining districts and is designed to be specially adapted to the requirements at Cape Nome.

There is also shown a cut of the same type of pump directly connected to high speed engine, making a neat and compact pump, which may be used exclusively for water, or for gravel and water pumping.



Direct Connected Pump.



Six-Inch Sand and Gravel Pump.

MINING AND SCIENTIFIC PRESS.

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A CONSIDERATION of the factors controlling the copper industry leads to the opinion that the holders of good copper mining shares may look forward to a prosperous time. There seems to be small probability that copper production will ever be in excess of the absorption of the metal, although a temporary fall in price may occur during attempts to control stock. There is no reason why new mines, not excessively capitalized, with plenty of working capital and under good management, should not succeed.

THERE is a difference between a mining partnership and an ordinary or general partnership. In the latter enters the element of trade; the former is generally made for some specific purpose and is more limited in its rights, duties and requirements. In an ordinary partnership the act of one partner binds the firm. This does not usually obtain in a mining partnership. The presumption of liability for the acts of each other is much less in a mining partnership than in an ordinary or general partnership, and the partners share all the losses and profits. In a mining partnership the one creating or assuming liability for his associates must furnish more specific proof of his authority in that direction than that ordinarily required from partners in a business.

THERE is probably more effort expended in devising machines and methods for use in mining and metallurgy than is given to invention in any other line. Every day, almost every hour, some one appears with an apparatus which has overcome all the objections applicable to contrivances performing the function which the new machine is designed to fulfill. It is notable that the greater number of these panaceas emanate from sources where mechanical and metallurgical knowledge is least found. So true is this that there has been begotten a disposition on the part of men engaged in the business of metal producing to discourage, without investigation, any attempt to direct their attention to new things unless presented by familiar hands. This attitude is inimical to progress and undoubtedly retards the development of ideas of commercial importance to the two industries. It is true that new enterprises in mining and metallurgy adopt a dangerous policy in departing very far from methods the efficiency of which is well established; but, on the other hand, the efficient methods could not be so characterized until time had proven them, and they were open to suspicion at the beginning as the invention of to-morrow will be. It is probably due to the great attention given to invention in this field that there has been such marked progress in appliance and process. Yet the inventor of mining and metallurgical mechanism lives in an atmosphere charged with discouragement and it is an occasion for wonder when he accomplishes anything. Wholesale condemnation of new things just because they are new, is as open to criticism as indiscriminate laudation of untried means.

Pacific Coast Iron and Steel Manufacture.

Often through the years are received accounts of iron deposits in various parts of this west half of America, usually accompanied by the statement that, if Pacific coast consumers only understood or knew about the vastness of that particular ore deposit, and how cheaply it could be mined and ore and steel made therefrom, deserved attention would be given it.

It is in order to briefly say that Pacific coast iron and steel workers are advised as to the facts, are cognizant of the situation and alive to the necessity of the hour. Much effort has been given to releasing the handicap in the industrial race, but unsuccessfully. The conditions are peculiar and are too well known to all interested to need extended explanation. The present development of California oil affords hope that existing difficulties may be overcome.

Elsewhere appears an article that essays to give some statistics and exact data, and for this reason is given place as being worthy of attention.

Briefly, the situation is this: In the East and South iron can be produced much cheaper than on this coast. Alabama and Pennsylvania can make pig iron at a profit for $7 per ton. Iron ore exists in inexhaustible quantities from British Columbia to Lower California, fuel is scarce—comparatively—and, of course, dear. Some time ago the editor of this paper asked a "big" coal producer why he didn't develop an iron property owned by him, close to coal and manifestly valuable. His answer was, "Because it isn't business. Why should I put coal into the manufacture of iron, when I can get practically my own price for the coal direct, without the bother of putting the value in the shape of iron?" We knew just what his answer would be, but here it is—an unanswerable statement—from the coal producer's point of view. The fuel problem is ever present. As stated, California oil may aid in its successful solution.

In the above paragraph is given the most prominent point. There are other considerations.

The iron and steel business is in the hands of great capitalists—"great" as to magnitude of operations. Suppose the gentleman who wrote the article on page 178, or any other of 100 fairly informed men, were able to conclusively show that, all things considered, a ton of good iron could be smelted and sold as cheaply in San Francisco or Los Angeles, or Portland or Seattle, as could eastern or southern made iron, and that the investor had concluded to look into the matter. Upon inquiry he would find that he would have a fight on his hands from the start with the trusts and the railroads, and that unless he was prepared to put up enough to be independent of the big iron and steel combines of Illinois, Michigan, Ohio and Pennsylvania, he would be in a dependent position.

It is not the province of a mining and scientific paper to go into business details. Herein is simply indicated the difficulties in Pacific coast iron development. This whole matter is one of evolution. The big combinations that menace the Pacific coast iron investor were once small, feeble industrial concerns. This paper believes that in encouraging local manufacturers, in unity of thought, purpose and action, in a broad-gauge plan of industrial development lie the most potent possibilities in this direction. The law of supply and demand can not always keep undeveloped the Pacific coast iron mines. The signs are that dwellers at "the back door of the nation" will "about face," and be at the nation's front door.

THE extra session of the California Legislature has tried to straighten out the legal tangle of the non-repeal of the State mining law of '97; but this is all it can do, as no new legislation is possible till the next regular session, when a law should be passed making mandatory the recording of mining locations in the office of the county recorder. Such recording would be a necessity alike to locator and purchaser, would deter strife and litigation and form a sure starting point for subsequent research as to ownership of mining property.

THE report of the California Debris Commission is the result of elaborate and intelligent investigation of the question, and presents in new form a proposed solution of the debris problem in that portion of California affected by the necessity for impounding barriers. The plan entertains the construction of a series of dams, and the creation thereby of restraining barriers and impounding reservoirs, with further idea of contracting the channel of the Yuba river to increase its scouring capacity. The estimated cost of the proposed work is $800,000. There has been $500,000 available for several years.

An Executive Department of Mines and Mining.

Three bills have been introduced in Congress looking to the recognition of the importance of the mining industry of the country and some adequate Federal representation thereof. One is H. B. No. 20, by Congressman Gibson of Tennessee, "a bill to establish a bureau of mines and quarries," and, while it is probably well meant, is everything that such a bill should not be, and contains no elements worthy of commendation by the mining industry. It makes the whole thing cheap and petty, and, if enacted, would muddle matters more than they now are.

Congressman Osborne of Wyoming has introduced a much better bill, creating a national department of mines and mining, a secretary and assistant secretary of mineralogy and mining, and recognizing the importance of the industry. That bill is worthy of commendation and would not be opposed by any miner anywhere who understands existing requirements.

H. B. No. 5030, "a bill to create an executive department of mines and mining," was introduced on the 3rd ult. by Congressman Barham of California. Its full text is as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be at the seat of government an executive department to be known as the "Department of Mines and Mining," the general design and duties of which shall be to acquire, by examination, practical and scientific experiments, geological research, or otherwise, useful information on subjects connected with mining in the general and comprehensive sense of the word, and to diffuse same among the people of the United States.

SEC. 2. That said department shall be under the supervision of a secretary of mines and mining, who shall be appointed by the President, by and with the consent of the Senate; and section one hundred and fifty-eight of the Revised Statutes is hereby amended to include such department, and the provisions of title four of said Revised Statutes, including all amendments thereto, are hereby made applicable to said department.

SEC. 3. That there shall be in said department an assistant secretary of mines and mining, to be appointed by the President, by and with the advice and consent of the Senate, who shall perform such duties as may be required by law or prescribed by the secretary thereof.

SEC. 4. That the secretary of mines and mining shall receive the same salary as is paid to the secretary of each of the executive departments, and the salary of the assistant secretary of mines and mining shall be the same as that now paid to the First Assistant Secretary of the Department of the Interior.

SEC. 5. That the duties now imposed by all laws and parts of laws relating to mines and mining affairs exclusively upon any existing department of the Government, or any division or bureau thereof, shall, on and after the day this Act takes effect, be performed by the department of mines and mining.

SEC. 6. That the Geological Survey is hereby transferred to the department of mines and mining.

SEC. 7. That on the organization of this department all officers or employes wholly engaged in official work in any department of the Government, or any division or bureau thereof, engaged in the performance of the duties referred to in section five of this Act, and all such employed in the departments referred to in section six hereof, shall be transferred to the department of mines and mining.

SEC. 8. That all records, maps, documents, instruments, surveys, machinery, and other materials now in the possession and use of any existing department of the Government, or any division or bureau thereof referred to in sections five and six of this Act, are transferred to the department of mines and mining.

SEC. 9. That this Act shall go into effect on the 4th day of March, 1900.

The above bill is desirable, complete and deserving of endorsal. It realizes the extent and dignity of the great basic industry of the nation, it shows knowledge of the subject, and due desire to appropriately supply an existing necessity; it makes essential provision for the proper conduct of the work and justly aggregates much of the valuable work previously done to continue under proper direction. The transfer of the Geological Survey is a necessary part of the proposed legislation, and we are assured by representatives of that branch of the public service that no objection exists therein. On the 12th inst. the bill was favorably reported by the House Committee on Mines and Mining, and it is within the limits of probability that it may receive equal recognition by the Senate Committee this session.

The Barham bill would be of value to the nation and of benefit to the mining industry, and its passage would be in line with all national requirements.

Concentrates.

THE origin of El Boleo copper ores in Lower California is ascribed to volcanic action.

IN brazing steel, a wash of clay and black lead will prevent the solder or brass from flowing.

A STEEL CABLE 1½ inches in diameter, traveling twelve miles per hour, can transmit 1800 H. P.

PICTURES can be sent by telegraph. The process was fully described and illustrated in the issue of Sept. 7, 1895.

METALLIC PACKING is used for steam engine piston rods. It is made in metal rings, or mixed with other packing.

THERE are nineteen prisoners in the Montana penitentiary taking a course in the correspondence school of engineering.

TO A MINER "mineral" ordinarily means "ore;" "mineralized," charged or impregnated with metalliferous mineral.

BY USE of the quadruple effect distilling apparatus it is possible to evaporate thirty-six pounds water to each pound of coal used.

IN laying a pipe line twenty miles long, using 2-inch and 3-inch pipe, the least friction will be occasioned by laying the 3-inch pipe at the pump end of the line.

IN the explosion of gunpowder the carbon is oxidized to carbon dioxide, and the sulphur to sulphur oxides at the expense of the oxygen of the potassium nitrate.

A GRAVITY BATTERY does not polarize because the negative plate has no hydrogen set free on its surface. Copper is deposited there, and that is its own material.

THERE is no hydraulic mining carried on in Chile. A few small "trapiches" and Chilean mills are in use. Dry crushing is generally used, ball mills being in most favor.

DIVIDING the number of ampere hours by ten gives the working current. "Ampere capacity" is a technical designation of what is known as the "working current."

IT is stated that the Calumet & Hecla, Mich., will use steel pillars instead of timber for underground purposes next summer. Scarcity of good timber is given as the reason.

HYDROGEN is the most powerful gas for lifting purposes: 1000 cubic feet would raise seventy pounds. The same quantity of ordinary illuminating gas would lift thirty pounds.

A FIVE-TON Bessemer converter consumes 2400 cubic feet of air per minute. Blowers are now made to give at 200 revolutions 4600 cubic feet of air per minute at seven pounds pressure.

A ONE-EIGHTH H. P. dynamo would require an 8-inch motor, using a ¼-inch jet of water, twelve gallons per minute, running at 1200 revolutions per minute. The pipe could be ⅜ inch or 1 inch.

THE formation of the sulphate of zinc on the outside of the jars of a gravity telegraph battery ought to be prevented by coating the edges of the jar with melted paraffine wax. Coal oil may also be used.

ALIENS who have resided in the United States six months or more, and who have declared their intention to become citizens of this country, can be licensed as engineers or masters in the American merchant marine.

THE present development of California's oil resources favors the belief that sufficient oil may be thus produced to form an effectual element in the solution of the fuel problem, and thus materially aid in California manufacturing.

AMBER is a specialty of Prussia, a monopoly worked by a firm which owns the two best mines, Palmnicken and Kraxtepelle, for which concession they pay the German Government an annual royalty of 650,000 marks—about $162,000.

IN the case of supposed or alleged infringement of patent the novelty of a design is to be tested, not by investigation of the means employed for its creation, but by ocular comparison of the design itself with the prior designs in the art.

ELECTRICITY can not be considered per se to "cure" any disease of the human body; intelligently applied it may have helpful effect upon the muscular or nervous system, but the claims made for it in newspaper advertisements are not to be taken seriously.

A COLD-AIR ice machine's average production is two and one-half tons of ice per ton of coal consumed. There are machines that will produce ten tons of ice per ton of coal consumed. The Vulcan Iron Works, 535 Mission St., San Francisco, makes a specialty of refrigerating apparatus.

ALUMINUM can be cleaned and its mat restored by dipping for one and one-quarter minutes in a solution of three ounces of caustic potash or soda in a quart of water; then washing well and dipping in a solution of three parts nitric acid and three parts sulphuric acid (by volume).

THERE are several important devices that can be considered as in pairs, one of each pair being a "reversal" of the other. Thus the dynamo, which transforms mechanical into electric energy, on being reversed becomes the motor, which changes electricity back again into the mechanical form.

AN assay or a determination of specific gravity will distinguish between gold and an imitation thereof. As a rough test it may be said that gold should dissolve in a mixture of one part nitric with three parts hydrochloric acid; a residue indicates silver. If sulphuric acid be added to the solution a precipitate indicates lead.

SLIMES, after screening from scrap copper, are ordinarily about 4% of the total weight of the anode copper refined. They run from 15% to 30% metallic copper, 45% to 50% silver, a little less than 1% gold, and from 20% to 35% of other metals. The resulting bullion has to be refined. At Perth Amboy, N. J., and Baltimore, Md., they are boiled with dilute sulphuric acid.

THE best way to repair a commutator is to take it apart and replace the mica; but temporary repair can be made by using thick shellac solution and dry plaster of paris. Fill the crack with the shellac, then put on the plaster, kneading with knife blade until it is stiff and smooth. Let it dry six hours before scraping off the top even with the surface. It should be thoroughly dry before the armature is used.

MINERS AND MINE OFFICIALS are invited to use this paper as an interchange of information on practical mining subjects, modes and methods of doing practical, every-day work. Ideas and descriptions of how work was done are always of value, and if such idea or description can be improved on, an intelligent man naturally wants to know what that improvement is, so that he can use it, and thus be of more value to himself and his work.

HIGH-PRESSED steam is considered economical. It requires nearly as much heat to generate steam at the pressure of the atmosphere as it does to generate it at 200 pounds pressure on the square inch. Although in the latter case the temperature of the steam would be considerably above 212° F., yet, as the sensible heat of the high-pressed steam increases, the latent heat decreases, and the result is, it requires very little more heat to produce a pound of steam at a pressure of 200 pounds on the square inch, than that required to make a pound of steam at a pressure of fifteen pounds on the square inch. The use of high-pressure steam in modern engines is increasing.

"ROSETTE" copper is an obsolete product. It used to be obtained by the old method of refining black copper, which was melted in an open hearth with charcoal, the impurities oxidized away, and the copper rendered dry by the blast current. When the copper had become quite saturated with oxide of copper and red in color it was removed from the hearth in the form of "rosettes." This was done by allowing the surface of the copper to chill, and then lifting off the solidified cake. By repetition this was continued till the cavity of the hearth was empty. These "rosettes" were afterwards melted in a smaller hearth, where the reduction of the copper was effected.

TO MAINTAIN an electric arc 1 inch long requires about 118 volts. In an arc light produced by alternating currents both carbons are consumed at the same time, and both remain pointed. A bichromate of potash battery solution is made as follows: Water, 9 quarts; pulverized bichromate of potash, 2⅜ pounds; sulphuric acid, 7½ pounds. The powdered bichromate of potash is dissolved as far as possible in the water, and the sulphuric acid is added very slowly, stirring continually with a glass rod. The mixture heats by degrees, and the bichromate becomes completely dissolved: when once dissolved the solution remains clear, and crystallization does not take place upon cooling.

WITH a suitable field magnet, every foot of active wire on the armature of a dynamo will generate about 1.2 volts, when the velocity of the wire is about 40 feet per second. As the wire which lies in the neutral part of the field is 20% to 25% of the whole amount of wire on the cylindrical surface, the active part is 75% to 80% of the whole. For 110 volts the length of active wire will be 110÷1.2=92 feet of active wire, which must be embraced by one pole piece. On account of the wire being in two halves, in multiple arc, the length of active wire on one-half of the armature surface will be 92÷0.75=1.23, the whole length of active wire being 246 feet. The size of the wire will be determined by the allowable resistance.

"CONCENTRATES" confesses inability to answer a question asked simultaneously this week from three different sources—"We are offered what we want to take for our property, all but one man. There are four of us owning a good prospect, for which we are offered a fair price. Three of us are willing and anxious to sell; one won't sell, holding out for a bigger price. The proposed owner, the man who makes the proffer, says: 'Settle it among yourselves. I must have all the property and you must all sell together.' What is best to do?" That is a constantly recurring situation, and constitutes a hard question to answer. Where possible, it were better for the three willing to sell to buy the fourth man's interest.

CHLORINATION is more universally applicable to ores; the chemical part of it is comparatively simple. Cyaniding gives better results where all its chemical requirements are given full attention and the ore is peculiarly susceptible to its action. To say which is "cheaper" is impossible. The problem in all cases—commercially considered—is one of profit; there are cases where one would be a failure at any cost, and the other a success at comparatively little cost. The process must in all cases be suited to the ore. Find out what other people with the same kind of ore are doing. Get their experience. It may have cost them $20,000 or $30,000 to find out by costly experiment what was the best for them to adopt. Even then you must figure on conditions. No two cases are just alike, even when the ores are similar. It may be in your case that neither cyaniding, chlorination nor any other wet process is the best. Get some specialist, a good one, and pay him for good advice. Whatever pays the best, that is the best process, no matter whether the result is 75% or 90% of the assay value. All this, of course, from a commercial, not a chemical or metallurgical standpoint.

LITTLE has lately been heard of "argentaurum," a term used by Dr. Emmens to designate the result of alleged transmutation of silver into gold. It is or was possible by proper procedure to get some gold out of former Mexican silver coinage, but whether it was commercially profitable is doubtful. Finer assay and parting methods in Mexican mintage no longer admit of the former retention of gold in Mexican silver money, and the supply or source of "argentaurum" may thus be decreased. Of course, if any one wishes to believe that silver can be changed into gold it is his privilege to do so. So long as absurd belief does not occasion injury to others it is not to be restrained. This paper has fully discussed "argentaurum," and does not see any reason to change its views.

DOUBTLESS all rocks are slowly changing into the crystalline state. All the shales become sub-crystallized as slate; all the limestones become crystallized as marble; all the sandstones become crystallized as quartz. The first indications of change are noticed in the sandstones that are said to be micaceous—that is, they are seen to sparkle with reflected light from the little plates of mica forming in the interspaces between the grains of the stone. All the stratified rocks are undergoing a change from the stratified to the unstratified condition. Granite is considered to be the most primitive rock exposed to human observation. All known rocks have been derived therefrom—that is, the proportions in which the rock matter is contained in the granite correspond to the united composition of the different varieties of rocks.

VENTILATING pipes should always be as tight as possible, and when air is used under strong pressure, as with blowers and high-speed fans, the pipes should be perfectly airtight. Small leakages are not allowable, for as much power is used upon every cubic foot of air lost as upon the same volume utilized. The higher the pressure the greater the leakage through holes of the same area. Wrought-iron pipes are often used, but steel is coming into general use. The best styles are the spiral riveted or the welded seamless, when the air is at considerable pressure. For low pressures a cheaper style will answer. To protect against rusting, in wet mines, the pipes may be either galvanized (and regalvanized after riveting) or coated with coal tar or asphalt, applied at high temperature.

IN general, ore deposits represent a process of concentration of mineral matter either by chemical or physical means—that is, they are unusual localizations of certain minerals which are often found disseminated in smaller quantities in many common rocks, and they differ from the same minerals situated in other conditions only in their degree of concentration. There is a superficial alteration of nearly all ore deposits. The typical unaltered condition of gold in nature is in association with iron pyrites in quartz, and the effect of surface oxidation on such a deposit is first to convert the iron pyrites into hydrated oxidized iron minerals which permeate the quartz, turning it into a rusty brown mass. The next stage is the gradual leaching out of the iron minerals by the action of surface waters, while the gold which was originally in the iron pyrites mostly remains, though it may have been partially dissolved in one or more several ways. Sometimes, as for instance in Colorado, gold occurs in the form of telluride instead of in iron sulphide, and in such cases superficial oxidation causes the tellurium to be oxidized and the gold to be set free from its combined state. When such deposits as those described are eroded the particles of gold separate from the quartz and are concentrated in the streams as placer gold.

THE origin of ore deposits and mode of deposition can be conveniently observed at Steamboat Springs, Nevada, where clouds of steam issue from many vents, over a bare rocky space half a mile long, in a narrow valley lined by volcanic ridges on each side. The vents are separated but occur in parallel lines, showing that they are connected by fissures, filled with opaline quartz. The fissures traverse a continuous crust of deposited quartz, some open, some partly filled with quartz, water issuing from a narrow middle crevice. Some are wholly filled with quartz and have become true quartz-fissure veins. Some of these larger fissures are half a mile long, a foot wide, open and parallel, about 25 feet apart, and descending downward to the bottom of the quartz crust 30 feet, can be followed no farther because they have deposited quartz in such abundance as to cover up their original vents in the underlying rock. Water does not issue from all the fissures, but can be seen and heard 8 or 10 feet below in violent agitation from steam and carbonic acid gas. The quartz filling these fissures in the hottest parts is gelatinous, in others spongy, and in others hard, or in layers of agate, chalcedony or sugar quartz. Everywhere there is the same distinct ribbon or banded structure, resulting from successive layers of quartz being laid on the sides of the fissure by watery solutions. The quartz in these fissures contains sulphides of iron, copper, cinnabar and even free gold. The metallic contents, as in old fissure veins, are in much less proportion than the quartz veinstone.

The Silver Plating of Amalgam Plates for Gold Mills.

Written by ALLAN JAY CLARK, E. M.*

When, during the summer of '97, the silver-plated amalgam plates of the mill of the Homestake and Highland Mining Companies, at Lead, South Dakota, showed signs of wear an interesting question presented itself. There were about 300 of these plates, each 54″ wide, the length varying from 8′ to 12′, the latter size predominating. On account of the probability of a considerable accumulation of values upon these plates, as well as by reason of the heavy rates of transportation to eastern points, it was undesirable to ship these plates for retreatment, while their sale to a smelting company would have been equally inadvisable. On the other hand, the decreasing gold recovery as the silvered surfaces became worn was very pronounced and called for immediate action. It was in consequence decided to do the work at Lead, and the plant here described was accordingly installed.

The process of silver plating is of course well known, but in his investigation of the subject the writer found that but little of the literature was "up to date," while much was wholly misleading.

Moreover, the particular problems presented by these plates, so long covered with mercury and amalgam, could only be ascertained by experience. As the use of silver plates seems to be steadily increasing in the mills of this country, it may be of use to collect the notes of the operations of the first year and to describe briefly the methods employed and the difficulties encountered.

THE PLANT.—The operations (with the exception of the preliminary cleaning) are performed in a single well-lighted room, 28′x40′, connected with the assay office of the company. In this room are the motor and dynamo, solution tanks, working bench, painting racks, furnaces and water connections, while a wide platform, extending around two sides of the building, provides a convenient storage place for the painting, thereby giving more room for the operators inside.

In the absence of steam connections, the necessary heat for dissolving the silver for the solution, for heating the cleaning bath of potash, etc., is obtained from a pair of low furnaces placed at the side of the room, the heated products of combustion passing through flues 3′ 6″ wide and 16″ above the floor level. Over part of these flues is a hood, so arranged that it will carry off the nitrous fumes arising from the preparation of the solution, and will also, when the furnace is not in use, be available for the regular work of the chemical laboratory. A 2″ pipe supplies the necessary water. The floor throughout is of cement, sloping from the walls to the center, where a gutter carries the wash water, etc., to the drain. The power is taken from the main circuit of the company—a 110-volt incandescent light line—and drives a 7 H. P. motor, C. & C. make, especially wound, and directly connected with a dynamo, a Hanson & Van Winkle plating machine of 3 kilowatts and 800 revolutions. The foundations of the machines are of cement, raised about 2′ above the floor level. Although these machines are in no way protected from the corrosive action of the acid fumes or from the dust of the assay office, they have required no repairs beyond the reshaping of the dynamo brushes and a renewal of those on the motor.

The tanks are three in number:

1. The solution tank, inside dimensions 15′ 6″x30″, is of redwood 3″ thick, heavily strapped and lined with a thick layer of asphaltum. To apply the asphaltum, the tank, after being put together was laid on its side, the molten asphaltum poured in gradually and ironed smooth. The handling of this large tank is achieved by use of a traveling crane, which gives access to every part of the room, and is used as well for the daily handling of the amalgam plates. The spreading of these tanks when filled with solution is surprising, as much as 2½″ increase of width at the center having been noted. Great care must be exercised, either when filling or emptying, to correct this tendency with the straps. The tanks are set in pits 3′ deep, cement lined, and open to inspection on all sides, so that any signs of leakage may be quickly discovered and repaired. As a precaution against leakage, however, the pits are made large enough to carry all the solution in the tank, while at a convenient place a slightly greater depth is provided to pump out all solution so escaping.

2. The so-called stripping tank is similarly constructed and mounted. This tank was built for use in cleaning the old plates, and proving a failure, has been abandoned.

3. Outside of the building, and below the ground level, is a third tank of pine 10′x5′x5′, designed for use in storing the solution when repairs to the solution tank are necessary or when the solution has become so fouled as to require filtering. This tank is lined with a simple coating of asphaltum dissolved in turpentine, and as it is not designed to carry the solution for any length of time, its factor of safety is much lower. It is so placed that the solution may be siphoned to it.

HANDLING THE PLATES.—Holes are punched at intervals of 2′ along one edge of the plate, and through these long hooks are passed, which hang from a long crossbar suspended by a differential pulley from the crane. There are three bars provided to carry the plates while in the solution. When one plate is in the bath, only two of these are used; when two plates are treated they are hung back to back upon the middle bar while anodes are suspended on either side. These bars require a support at the center. To support the center bar, and at the same time to be able to remove one plate from the solution for inspection without disturbing the other (a very desirable feature), the arrangement shown in Fig. 1 is used. To

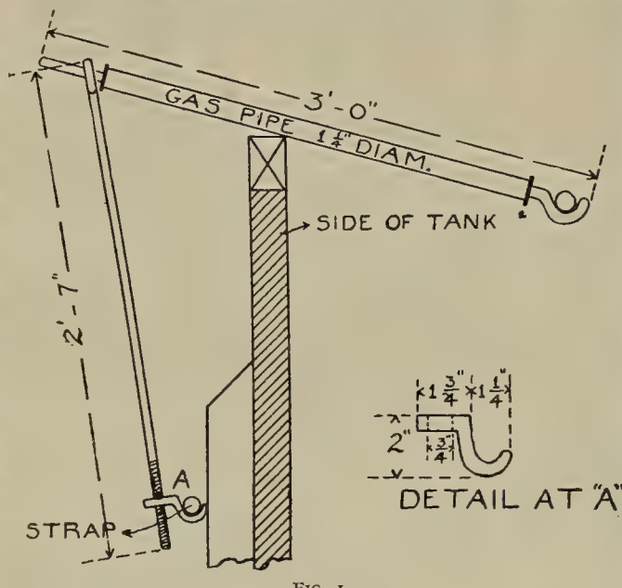


FIG. 1.

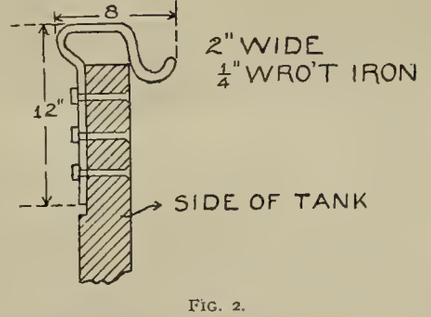


FIG. 2.

support the side bars the method is as shown by Fig. 2.

PRELIMINARY CLEANING OF THE PLATES.—To secure a proper contact of the silver with the copper surface, a contact which will resist the daily scraping of the amalgamators, the plate must be absolutely clean. The slightest trace of dirt of any kind will cause a flaw in the work. The effect of the usual interfering materials is as follows:

1. "Scale" due to oxidation rolled into the surface of new flakes the silver deposits upon it in a rough, lumpy state, easily scraped off.

2. Thin films of oxide forming if the acid treatment is not quickly followed by a thorough washing and an immediate immersion in the solution. With this, the silver may deposit unevenly, but with so slight a tenacity that it will be washed off by the impact of the wash water applied after removal from the bath. Very similar to the latter is the effect of grease or oil of any kind.

3. PRESENCE OF MERCURY.—This, of course, is only present upon old plates. The deposition of silver upon it simply forms amalgam, which scrapes off at once. To remove the mercury three methods were tried before a satisfactory process was found:

(a) Cleaning by hand with steel scrapers, followed by treatment with acid to remove the last traces of mercury. Abandoned as too expensive in supplies and labor, and because of the discomfort attending the heavy fumes.

(b) "Stripping" in the tank already mentioned. The plate suspended as an anode in a solution of potassium cyanide, using iron plates as cathodes, and recovering on them any mercury, gold, silver, etc. This attempt was successful in so far as cleaning the plate was concerned, but, owing to the uneven depth of the mercury upon the copper plate, the effect was to "pit" the surface, forming small ridges and hollows over its entire surface. Although a good deposit could be made upon these plates, they failed to amalgamate well, the heavier sands settling in the hollows and effectually preventing the contact of the gold particles with the amalgamated surface.

(c) The "stripping" was followed by the use of a power scraper, which was established in one of the mills. It consists of a table, to carry the plate, so mounted upon a track that every part of the plate can be brought under the buff; a buff wheel, with emery cutting surface, and a small suction fan to collect the particles removed and to discharge them into a box of water, from which they are subsequently recovered. Two men can readily clean three plates in a ten-hour shift, alternating with one another, as the labor is too severe for steady work. The plates come to the plating room in excellent condition for further treatment, and the use of acids and abrasives can be greatly diminished.

On the receipt of the plate from the mill it is set upon a rack and the reverse side painted, in order to "stop off" the deposition of silver upon that side. A solution of asphaltum in turpentine makes a thoroughly good paint, inexpensive, easily applied and quick drying; paraffine may be used, but it is not as good in any way. Asphaltum dissolved in benzine is to be avoided, as it is softened and loosened by the plating solution. The failure of a plant is harmful in two respects: (1) By the loosened particles fouling the solution, and (2) by the waste of silver deposited on the spot left bare. Two coats of paint are applied, and twelve hours are usually allowed to elapse between the time of the second application and the immersion in the plating bath.

The paint being dry, the final treatment begins. The plate is carried to the working bench, and there treated with one or more chemicals, as its condition may demand. This bench is stoutly constructed of pine and covered with asphaltum, applied in the same way as lining the tanks. It is sufficiently inclined to drain freely, a gutter at the lower side carrying off the washings. Several small frames of 1″ material, faced with rubber strips, are so placed as to carry the plate, allowing all washings to run freely beneath it and protecting the paint. Since finishing work for a time, a hood has been built over this bench, and a small fan will be driven by a line of shafting from the motor to assure more perfect ventilation. The solutions, or "dips," are kept in earthenware jars of twelve and twenty gallons capacity. When using, these jars are placed under the drain from the bench, and the "dip" is poured from eartherware pitchers. Rubber gloves protect the operator's hands.

The various cleaning operations, as already stated, are used as the condition of the plate requires. They are: (1) Scouring with sand or pumice stone; chiefly resorted to in removing scale. (2) Acid dip—equal parts of nitric and sulphuric acid, with 1% to 5% of hydrochloric—to remove oxides and any mercury which may remain; the effect of the sulphuric acid seems to correct the too violent action of the nitric acid upon the copper, an action which results in the "pitting" of the smooth surface. (3) Potash or soda lye—a strong solution preferably used hot, to remove grease, etc.; this solution is kept in an iron kettle, and is applied with a mop. (4) Cyanide of potassium. (5) Finally, cyanide of mercury is added, and without washing the plate is immersed in the silver bath; this tends to improve the adherence of the deposit.

PREPARATION AND WORKING OF THE SOLUTION.—The bath used is a solution of silver chloride in potassium of cyanide (the double cyanide of potash and silver), with an excess of potassium cyanide present. The action of the current is to deposit silver at the cathode while the liberated potassium cyanide replenishes the solution by dissolving silver from the anode. The excess of potassium cyanide insures a faster and more even working. In preparing the solution, granulated silver .999 fine is dissolved in nitric acid, the silver deposited as chloride by the addition of salt, washed and transferred to a large filter placed above the tank. The cyanide is deposited directly in the tank and the solution pumped through the filter until the silver chloride is completely dissolved.

For the particular work under consideration, good results may be obtained within a considerable range of strengths of the solution. A solution carrying 2½ ozs. silver and ½ lb. cyanide to the gallon gave very satisfactory results. Care must of course be taken to have sufficient anode surface, that the silver content may not be impoverished. From fifteen to twenty anodes, each ¼″x6″x3′–0″, were used per plate. The ordinary range of temperature does not affect the work. Presence of insoluble matter becomes troublesome after a time, and a filtration every six weeks is beneficial. Amperage and distance between anode and cathode affect the rate of deposition; voltage determines the character of the deposit and may be fairly constant. With a solution of the strength described, and a distance of 16″–17″, a current of 1½ volts is ample; with two plates 10″–12″ apart, 2 or 2¼ volts may be carried. The rate of deposition is .35 to .50 oz. per square foot per hour. The position of anode surface with relation to cathode surface must also be considered, as the current follows the least resistance road through the bath, and the placing of one or more anodes beyond the end of

* School of Mines Quarterly.

the cathode will result in a too rapid deposition on the edges of the plate, with its attendant evil, a "hard" or "burned" deposit—i. e., a deposit showing a slightly yellowish coloration instead of the dead white of the proper working, rather lumpy but thoroughly adherent. A slight excess of voltage shows a similar effect; a great excess emphasizes it largely, the deposit forming in a heavy, powdery crust.

A new solution does not work as well as an old one; time is required to secure an even mixture of the various compounds. After a day's work the solution is stirred, with this object in view. Small additions of ammonia and ether seem to help to correct this tendency of a new solution, but their use is rarely necessary. It is highly desirable to remove the plates for inspection after the current has acted for ten or fifteen minutes. Any unclean spots or any surfaces upon which the plating is imperfect are shown, and a few minutes' rescouring may remedy the evil.

When the work was nearly finished, and the plant was being prepared for a shutdown of several months, an effort was made, by use of a greatly diminished anode surface and a low voltage, to remove as much silver as possible from the solution.

ANALYSES.—To insure good work, careful watch must be kept of the solution, and silver or cyanide added from time to time, as required. The methods of analysis used are briefly outlined below. They were selected after a trial of several others as being rapid and sufficiently accurate.

FOR SILVER.—Twenty-five cubic centimeters of solution are taken; to this hot, concentrated solution is added at once an excess of alkaline sulphide (preferably K_2S_x). Lime is added to settle the precipitate quicksilver; then filter, dry, remove the precipitate to a scorifier; burn the paper and add it to the scorifier with some test lead; scorify and cupel, observing the usual precautions as to heat.

FOR FREE K (CN).—The usual $AgNO_3$ titration method is used, with KI as an indicator. It has been the writer's practise to use a solution of 6.535 grams of $AgNO_3$ per liter, a strength used in the cyanide process, and to employ a set of tables to calculate the value, rather than to prepare a special solution for this work. With this standard, 10 cc. of solution are taken, diluted to 200 cc. and to 10 cc. of the mixture titrated.

RECOVERY OF VALUABLE PRODUCTS.—The scrapings from the buff are cleared in a Knox pan with mercury. The resulting amalgam is squeezed, retorted and melted into small bars, which are added to the regular bullion from the mills. They make up about 7% of the total weight of bullion. About 200,000 ozs. of amalgam were recovered from plates, which yielded after retorting and melting over 14,000 ozs. of base bullion, of a composition ranging from 14% gold, 14% silver and 72% copper to 5% gold, 23% silver and 72% copper. The scouring sand, etc., is settled in a box placed in the drain, and is returned to the mill. It is not in a proper condition for this treatment, however, and it would be better to sell to a smelter. A small additional amount was recovered from this source. Old and worn anodes are remelted, cast into bars and hammered into shape for a second use.

The cost of the operation, including labor and supplies, need not greatly exceed the cost of the silver. The work of refitting all the mill with new plates occupied about six months, during much of which time four plates were plated daily with 2 ozs. of silver to the square foot. It was considered advisable to have a plant larger than the actual needs of the company, as the time during which the plant lies idle is more than made up for by the increased recovery of the mills when the plates are in good condition. Moreover, when the cost of the building is included, the additional expense incurred by doubling the capacity should not be over 20%. It would not be wise to limit the width of the tank too closely; slight irregularities in the solution might demand greater distance between anode and cathode to insure good work.

"That Deadly Gas."

Written for the MINING AND SCIENTIFIC PRESS by A. THURSTON HEYDON.

Every mining region has its own peculiar problems, and one of those peculiar to the frozen north is that presented by the "wood gas" resulting from thawing by open fires. This problem presents an unusually serious aspect on account of the number of deaths which it has caused; nor are these deaths the results of negligence, as is usually supposed.

The writer would simply state that, in spite of an extended experience with the noxious gases found in the workings of poorly ventilated mines, he has been hoisted out of a shaft lashed in a bucket and dead to the world, and since that time he has studied the gas problem and experimented with it fully as far as personal safety would permit.

One of the results of these investigations has been the proving, as nearly as can be without actually dying, that a person can die from the effects of the wood gas, as it is found in the workings of the Klondike, and at the same time a candle would not only burn well but brilliantly. This result is corroborated by the experiences of others, and many of these experiences have terminated fatally. By this it can be readily seen that the candle, which is the ordinary means of detecting gas in dangerous quantities, is utterly useless under certain conditions.

It is true that carbonic acid gas, being heavier than air, collects in the lowest places, the same as water, and will put a candle out immediately. It is equally true that carbonic acid, under the proper conditions, will rise and float through the air in such quantities that no human being can remain in it more than a few minutes, and yet at the same time a candle will burn well.

Carbonic acid gas will dilute with air until combustion can be sustained, and yet prove fatal to life; but then the candle will burn very dimly, while it takes some little time to produce unconsciousness. But yet in the case in hand the candle burns brightly. That is because that when the carbonic acid gas of a certain strength is cooled below a certain point it crystallizes into minute particles, which rise and float around in the atmosphere and dissolve under the influences of warmth and moisture. In that condition there is sufficient oxygen between the particles to sustain combustion, though the inhalation of the particles would knock a man out in short order. These particles can be seen when the light is just right, as sometimes occurs in the tunnels of the benches, floating in the air just as motes are seen in the sunshine, and all evidences of the presence of carbonic acid vanish when they disappear. These particles are exceedingly acrid, and upon contact with the mucous membranes of the eye and respiratory system they dissolve and produce inflammation. Every one who has worked in a shaft or drift after a fire, and nearly every one who has been on the creeks while burning was going on, knows the effect of the crystallized wood gas upon the eyes; also that even when the air is so free from gas that the eyes are unaffected a few minutes' work will stir up enough gas to make the eyes water and the nasal passages burn, and that this will occur days after a fire. As the candle is useless as a detector of carbonic acid in its crystalline form, reliance must be placed upon the eye and nasal passages, which are extremely sensitive to it.

The effect of a dangerous percentage of carbonic acid is that of a cumulative poison, as the amount of oxygen does not suffice to eliminate the carbonic acid produced by the system and that absorbed by inhalation. In consequence the amount of carbonic acid in the system increases until the thickening blood moves so slowly that unconsciousness results, and then it is only a question of time until death supervenes.

One of the moments of greatest danger occurs when a person nearly overcome by gas reaches the fresh air, as almost as soon as it is inhaled a person either becomes extremely faint or else collapses; so when in that condition a person should be tied to the rope or bucket to prevent falling.

The effect of carbonic acid, when there is enough oxygen to enable a candle to burn, is to cause a burning sensation in the eyes, while a sensation of closeness gives rise to a desire to emigrate. Next, a peculiar bewildered feeling steals over the brain, bringing a sensation of utter helplessness, while there is a flush of fever as the heart beats with more rapidity than strength, and the veins of the temples swell and throb. Then a feeling of death-like faintness and nausea brings an almost irresistible desire to either sit or lie down. This stage is followed by unconsciousness, although sometimes there is a brief interval during which the brain is remarkably clear and cool. The lapsing into unconsciousness is accompanied by a most delightful sensation of peace and rest, while it makes no difference whether school keeps or not. But the recovery is not so pleasant, as, aside from the discomfort of the giddiness, headache and nausea, it is often a matter of days and weeks before one feels all right again; besides, the knowledge that one has stood within the portals of death has a sobering effect.

When a person is working where gas does not exist in dangerous quantities a dash of water or a shovelful of snow has a wonderfully refreshing effect, and there is no quicker way to get oxygen down the shaft nor of revivifying a person who is so nearly overcome that he can hardly help himself.

In cold weather the smoke and gas roll out of the workings, but during the warm weather they hang heavy and cling to the cold, damp places. At such times a blower or fire blast is the only efficient means of removing the gas, although water dashed down the shaft or hot rocks, which convert the water into steam, with which the gas combines readily, is of great assistance.

The means used to revive a person overcome by gas are the same as those used for the resuscitation of a drowned person—the two most successful expedients, which alternate, being to lay a person on his face, stand astride of him, clasp him around the body just below the breastbone, and jounce him up and down, and then, holding him in a sitting position, raising his arms above his head and lowering them at rates varying from ten to twenty times per minute. This treatment should be kept up until consciousness is either restored or else all hope is lost.

Cyanide Plant at El Dorado Canyon, Lincoln Co., Nevada.

Written for the MINING AND SCIENTIFIC PRESS by A. E. VANDERCOOK.

The tailings of the Southwestern Mining Company that we are now running on were accumulated about twenty years ago, the ore being dry crushed in a 15-stamp mill and worked with a White & Howell furnace and pan amalgamated for the silver, saving a very small percentage of the gold.

Charles Gracey came here in '95 looking for low-grade gold ores, which he found in the mines and dumps, a portion of the values being free gold. After changing the mill to wet crushing and plate amalgamation, a test run of several thousand tons of ore was made with satisfactory results.

In '97, parties leasing the Dolly mill arranged to work the tailings by plate amalgamation and concentration, paying $1 per ton for same; some fifty tons were taken down the river to the mill, about a mile from El Dorado canyon, but they were unable to



Leaching Tanks—Cyanide Plant, El Dorado Canyon, Nevada.

make it pay and a sample was sent to me to experiment on. I made several tests by the cyanide process, which gave me from a .1% solution of cyanide 96.5% extraction of the assay value, which led to the erection of the present plant, consisting of one Dodge pulverizer, one solution pump, one zinc lathe driven by a 15 H. P. Daniel Best gasoline engine, eight



Tailings Pit, Showing Cemented Condition of Tailings, El Dorado Canyon, Nevada.

wooden-bottom iron leaching tanks 14 feet in diameter, 3 feet high, with false bottoms and discharge door, four zinc boxes 12 feet long, 1 foot wide, 1 foot deep, containing eight compartments, and two solution tanks which began operation in April, '99.

On November 1st, '99, I was placed in charge, under Charles Gracey, manager. Owing to the cemented condition of the tailings, which have formed a solid wall along the Colorado river bank, withstanding the high water, they are blasted and repulverized through a 10-mesh wire screen, delivering to the ore bin below and from there to the leaching tanks by cars, the tanks holding an average of fifteen tons each.

When a tank is charged with tailings a strong solution of .25% cyanide is forced up through the pulp from below until the tank is full, then the valve in the discharge pipe is opened and a weak solution run on

top and allowed to percolate for forty-eight hours, then sufficient waste water run on and the tank is allowed to drain. After a tank has perfectly drained, its contents are sluiced out; time required from one to one and a half hours, and the tank is then ready for another charge.

The discharge pipe carries the gold and silver solution to a sump tank. Owing to the fact of not having sufficient fall, the solution is pumped to another sump tank and the stream divided equally to each zinc box.

In the erection of the plant provision was made for only one pipe line to distribute the solution to the leaching tanks, which necessitated the shutting off of the weak solution while a tank was being charged with strong solution. By the present addition of another pipe line we are now handling a larger volume of gold and silver solution, keeping a continuous flow through the zinc boxes, and, by using a strong and weak solution, obtaining a higher extraction and a saving of cyanide. From the boxes the solution flows to the storage tanks.

The strong solution returns to the zinc boxes carrying from two and a half to three pounds cyanide to the ton, which is used for the weak solution and to make up the volume of the strong solution which is standardized for the tanks following.

The tailings carry about equal parts gold and silver, producing high grade gold and silver cyanides. Under the present conditions they are extracting 95% of the gold and 65% of the silver.

They are now contemplating putting in a larger mill to work the low-grade ores, with a cyanide plant to treat the tailings. The ores being of a silicious limestone character, containing some coarse gold, the tailings are adapted to the cyanide process.

The mines were located in '61 (the district then was supposed to be in New Mexico) and are from six to nine miles from the mill. After an expenditure of a large amount of capital they were never made to pay, but now, with the cyanide process and traction engines to haul the ore at a very low rate, the low-grade ores of this camp can be made to pay a handsome profit.

Self-Righting Mine Skip.

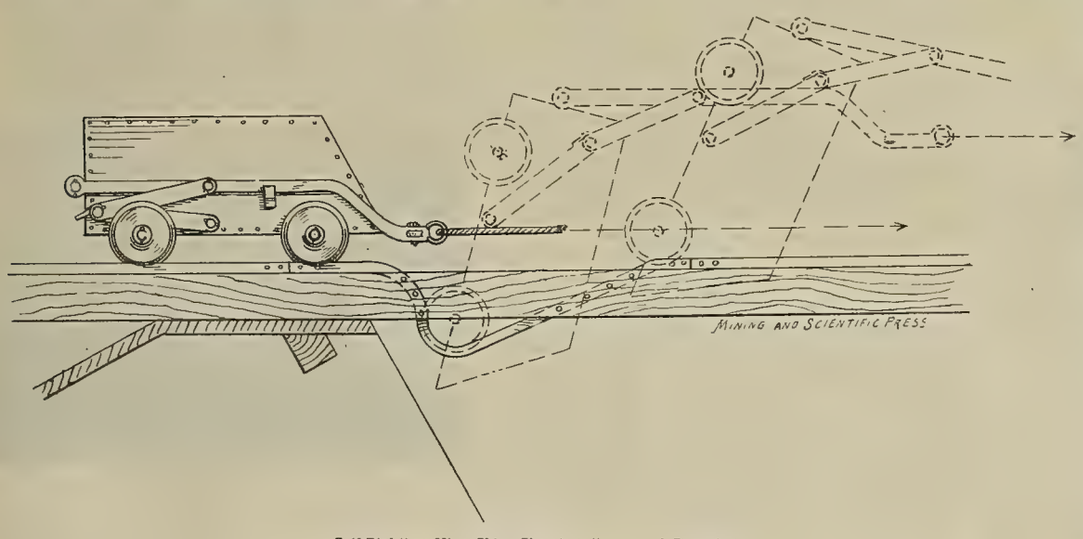
TO THE EDITOR:—I send a sketch of a self-righting skip which I was called on to design at the Gambetta mine, Grub Gulch, Madera Co., Cal. The superintendent did not want the usual six-wheel self-dumping skip, as the space in the shaft did not allow much width about the skip. So these "bucking straps," as the miners called them, were apparently the only way to overcome the difficulty. The engine being solid clutched, no "bumpers" could be used to keep the skip from turning over at the dumping pocket, as an inch or two over the exact place would tear out the bumpers and the skip would turn over on its back. As the angle of the gallows track was 60°, the skip had to turn over one-quarter of a revolution to dump. If, by mistake, the engineer should run too far, the skip with the straps on would dump; and, while in that position, would continue out of the pocket and up the leeway track on its front wheels.

The design furnished and now in use there embodies three good points: First, no outside wheels; second, skip will not turn over in dumping; third, gives the engineer leeway.

The first position in the sketch shows it approaching the dumping pocket, with braces folded on the side of the skip body. The second position is that taken in dumping, braces preventing turning over. The third position indicates action of skip should the engineer hoist too high.

The braces are knuckled 2 inches out of line to avoid dead center and folding the wrong way, when refolding. In case rock jams in skip it can be raised and dropped back in the pocket, loosening its load. The skip weighs 830 pounds; capacity one ton.

Grass Valley, Cal. C. T. ROUNER.



Self-Righting Mine Skip, Showing Manner of Dumping.

San Bernardino Iron Mines.

Written for the MINING AND SCIENTIFIC PRESS by C. H. HUBBS.

The property consists of twelve claims, or locations, 600x1500 feet each, duly acquired under United States mining laws, of proper record and perfect title. The total area is about 250 acres. The property is divided into three groups, consisting of two, three and seven claims, respectively.

Group A of seven claims is situated upon Sections 27 and 28, Township 6 North of Range 4 East, San Bernardino meridian, and lies sixteen miles, nearly south, from a point on the Santa Fe Pacific Railway, about midway between Newberry and Hazlitt stations—273 miles by rail from San Diego and 180 from Los Angeles. Group B of three claims lies about two and three-fourths miles east-southeasterly from Group A. Group C consists of two claims, which lie about one-half mile east of Group B. Each group, in every desirable part, is accessible by rail connection, over a uniform grade of about 1%, the maximum possibly reaching 3% (down-loaded) from the main line of the Santa Fe. No cuts, nor fills, and practically no bridging would be required.

Whenever a justifiable quantity of ore is mined for shipment, tracks and rolling stock will be provided to move it. The freight costs to tide water would not exceed $2 per ton. The cost to mine the ore and load it upon cars would not exceed 50 cents per ton. The mines are situated in a timberless belt. Fuel, in the form of coal, oil or wood, would require to be shipped in by rail. Timber for building or mining purposes would be obtained in like manner, and at comparatively low cost. There is no surface water at the mines, and no steps have been taken to develop any. The chief chemist of the United States Geological Survey, after an examination of this ore, pronounced it "a very high-grade magnetic ore, with but a trace of titanium."

Pierre de P. Ricketts, ex-chief School of Mines and Metallurgy of Columbia College, New York, gave the following results from a determination made for the following elements only, viz.: Metallic iron, 68.84%; manganese, 0.038%; sulphur, 0.076%; titanium, 0.020%; phosphorus, trace.

Prof. Woulfe, chemist Union Iron Works, San Francisco, gave the following results from a carload each of magnetic and hematite ores sent to those works, viz.:

	Magnetic, %.	Hematite, %.
Sesquioxide of iron	66.80	81.94
Protoxide of iron	28.80	8.25
Alumina	2.843	3.24
Manganese oxide	0.52	0.43
Lime	0.72	0.82
Magnesia	3.83	3.18
Phosphorus anhydride	0.013	0.006
Sulphur	0.030	0.117
Silica	0.846	0.81

The Colorado Iron & Steel Co. gave the following analysis from samples aggregating fifty pounds, selected by the writer with great care from all the claims:

	Per cent.
Iron	66.25
Silica	1.68
Lime	1.38
Magnesia	3.32
Sulphur	0.031
Phosphoric acid	0.054
Alumina	0.84
Manganese	0.25
Iron peroxide	72.21
Iron protoxide	20.18
Manganese oxide	0.39
Phosphorus	0.024
Titanic acid	Nil

Best English or British Columbia coke can be laid down at San Diego by cargo at a cost of $7 to $7.50 per ton of 2240 pounds, and for a less sum at San Francisco. Tonquin, China, anthracite, almost equal to Pennsylvania hard coal, can be delivered at Pacific coast ports at $6 per ton by cargo.

The entire Pacific coast territory from Alaska to Cape Horn, the Hawaiian Islands, Japan and China would gladly draw their supplies of pig and manufactured iron and steel from California, were such commodities here produced. A 200-ton blast furnace would hardly be able to keep up with the demand. During the past two years tens of thousands of tons of iron have gone from Eastern and Southern States to the Orient via San Francisco, Tacoma or Vancouver, after adding the heavy charges for transcontinental shipment, and by direct water shipment by Suez canal or around the Horn steamers from California ports to Yokohama and Hongkong. To California — the nearest source of possible supply—belongs by right the greater portion of this export trade produced at home from abundant high-grade raw material with which this State has been so favored. Even so far back as 1896 there were imported into the port of San Francisco by rail more than 55,000 tons of manufactured iron and steel, exclusive of railroad material and pig iron. The magnitude of this business showing would be largely increased were it to include the large imports by water. During the same year the exports of machinery by sea to foreign countries from the same port amounted to over $627,000.

Pig iron at Pacific coast points of consumption commands at this time from $26 to $30 per ton, with an upward tendency, in sympathy with Eastern advances.

While it costs more to produce a ton of pig metal on the Pacific coast than in the East, the fact must not be overlooked that "cost to produce" is not the only element entering into the question of profit or successful production, or that a commercial value of $10 per ton is added to the iron on the west coast owing to transcontinental freight charges. The San Bernardino mines afford a much higher grade ore than the average reduced in the East or South. Our climatic conditions are far superior to those of either locality named, thus making possible less labor expense. The cost to produce pig iron at favored California points is, perhaps, $5 per ton greater on the whole than in the east of the Rocky mountains, but the metal is worth $10 per ton more here. Probably nowhere else in the world is so inviting, and at the same time so neglected, a field for profitable production. The approximate cost to produce a ton of pig iron at California tidewater from San Bernardino ores, using coke, as stated, for reduction would be as follows:

Mining 1⅛ tons ore	$ 0 80
Freight on 3584 lbs. ore	3 58
Lime	50
1800 lbs. coke at $7.50 per ton	6 02
Working charges	2 00
Incidentals	50
Total cost for 2240 lbs. pig	$13 40

Or if Tonquin anthracite were used in place of coke the cost per ton would be reduced to $12.20, or to $12.80 by consuming equal mixture of English coke and Tonquin anthracite.

Within the past few years coke has depreciated at California centers of trade several dollars per ton, and it is not believed the limit of reduction has yet been reached. With a blast furnace plant established on this coast, consuming a fairly large amount of ore, fuel, etc., no doubt the transportation charges could be materially reduced. It will, therefore, be observed that the selling price of pig iron may be materially reduced, thus tending to a largely augmented consumption, and still leave a wide margin between cost and sale for profit.

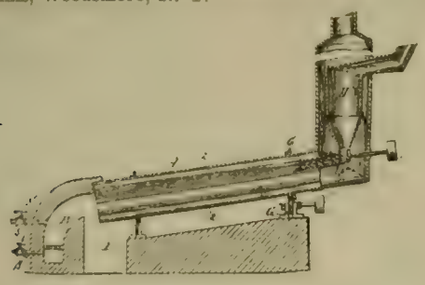
To the conservative man whose vision is not confined within the narrow limits of the present, clouded by the adverse conditions of the past, or intoxicated by the bewildering possibilities opening to his vision as he glances over the waters of the Pacific to the new civilization rapidly rising in the Orient, in Asia and the islands of the Pacific, with their hundreds of millions of people emerging from semi-barbarism to the uses and demands of modern tools and machinery, who command the world's great lever—capital—the field is open in so wide a form that he must be broad of mind and well informed to grasp the magnitude of the opening offered to the iron industry. The field for expansion and profit is almost beyond power of human comprehension. The time is at hand, and the conditions at their maturity, when a man or a combination of men uniting the qualities mentioned, becoming impressed with the world's new center of commerce, will grasp and utilize this prize, and through it will command and control this industry upon America's west coast.

Latest Mining and Metallurgical Patents.

Patents Issued Feb. 6, 1900.

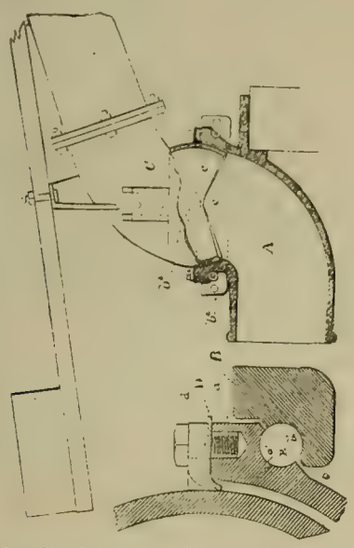
Specially Reported for the MINING AND SCIENTIFIC PRESS.

REDUCTION OF METALLIC ORES.—No. 642,584; C. G. Collins, Woodsmere, N. Y.



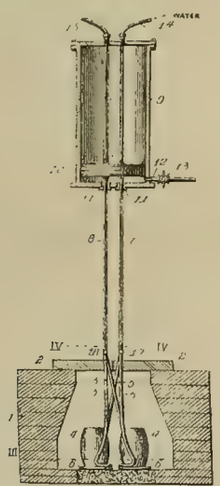
A process of preparing ores for extraction of metal which consists in mixing the powdered ore with powdered fluoride and subjecting mixture to temperature below fusion point in presence of water vapor.

HYDRAULIC GIANT.—No. 642,853; J. P. Simmons, San Francisco.



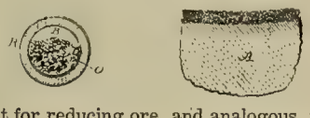
A hydraulic giant comprising stationary pipe having socket, curved movable section provided with ball joint adapted to engage with socket to form ball-and-socket joint therewith and exterior ring or washer adapted to oppose water thrust.

CRUCIBLE CARRIER.—No. 642,891; J. P. Bailey, Pittsburg.



A crucible carrier having in combination a loop of pipe, its lower extremity shaped to form a series of two or more coils adapted to receive and carry a crucible and its upper extremities connected one with a liquid supply and the other with a discharge.

RETORT.—No. 642,722; B. Sadtler, Denver.



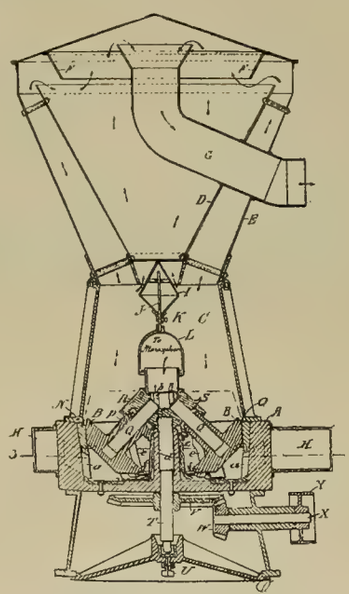
A retort for reducing ore and analogous purposes having body of fireclay, lining of basic material and a sintering material between body and coating chemically united to each.

CORE BREAKER AND LIFTER FOR ROCK DRILLS.—No. 643,082; M. C. Bullock, Chicago.



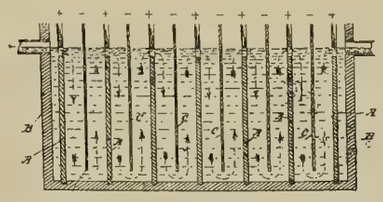
Combination with drill rod of annular cutting head movable endwise with recpect to drill rod, spring applied to extend cutting head, expansible core gripper and actuating means for core gripper embracing operative connections with cutting head, whereby core gripper is contracted when cutting head is thrown outwardly by spring, and extended when cutting head is forced inward by pressure against rock in drilling.

PULVERIZING MILL.—No. 642,717; A. Raymond Chicago.



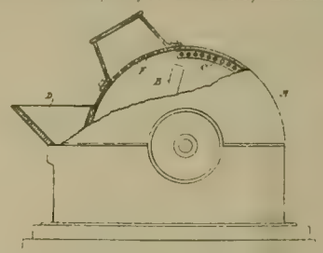
In a pulverizing mill, combination with stationary bowl provided with crushing face on its inner periphery, of one or more rollers capable of free axial rotation upon fixed axes and free bodily movement parallel with axes thereof, but toward and away from crushing face of bowl and means for imparting orbital travel to roller or rollers, each roller having a single crushing face oblique to axes of rotation and parallel with crushing face of bowl.

PROCESS OF RECOVERING GOLD AND SILVER FROM CYANIDE SOLUTIONS BY ELECTROLYSIS.—No. 643,096; S. B. Christy, Berkeley, Cal.



A process of progressive electro-concentration and recovery of gold and silver contained in large volumes of dilute cyanide solutions containing free alkali resulting from extraction of gold and silver ores, tailings and concentrates, consisting first, in depositing gold and silver electrolytically from solution upon removeable cathodes sufficiently numerous and large in area to secure efficient deposition, in making removable original cathodes successively anodes in a smaller volume of cyanide solution and transferring and depositing electrolytically the thin film of gold and silver, already distributed over a large number of original cathodes, upon a smaller number of secondary cathodes, also contained in smaller volume of cyanide solution.

DUST PREVENTER ATTACHMENT FOR ROTARY PULVERIZERS.—No. 642,747; J. Kullman, Benicia, Cal.



An attachment for a rotary pulverizer, open at bottom and formed with curved bottom edge adapted to be fitted and secured to curved top or cover of pulverizer.

Cutting Timber on Government Land.

Land Office officials have an important circular letter regarding the cutting of timber on Government lands which have been taken up under the mining laws. It provides that land that timber is cut from under this provision of the law must be actually mineral land. A filing will not be accepted as proof of such character and there must be undoubted proof that the land has veins of mineral in it before timber can be cut thereon.

The circular follows:

Department of the Interior, General Land Office, Washington, D. C., January 18, 1900.—By virtue of the power vested in the Secretary of the Interior by the first section of the Act of June 3, 1878, entitled, "An Act authorizing the citizens of Colorado, Nevada and the Territories to fell and remove timber on the public domain for mining and domestic purposes," the following rules and regulations are hereby prescribed:

First—The act applies to the States of Colorado, Nevada, Montana, Idaho, Wyoming, North Dakota, South Dakota and Utah and the Territories of New Mexico and Arizona, and all other mineral districts of the United States.

Second—The land from which timber may be felled or removed under the provisions of this Act must be known to be of a strictly mineral character, and "not subject to entry under existing laws of the United States, except for mineral entry." Parties who take timber from the public lands under assumed authority of this Act must stand prepared to show that their acts are within the prescribed terms of the law granting such privilege, the burden being on such parties of proving by a preponderance of evidence that the land from which the timber is taken is "mineral" within the meaning of the Act.

Third—The privileges granted are confined to citizens of the United States and other persons, bona fide residents of the States, Territories and other mineral districts, provided for in the Act.

Fourth—The uses for which timber may be felled or removed are limited by the wording of the Act to "building, agricultural, mining or other domestic purposes."

Fifth—No timber is permitted to be felled or removed for purposes of sale or traffic, or to manufacture the same into lumber or other timber product as an article of merchandise, or for any other use whatsoever, except as defined in section 4 of these rules and regulations.

Sixth—No timber cut or removed under the provisions of this Act may be transported out of the State or Territory where procured.

Seventh—No timber is permitted to be used for smelting purposes, smelting being a separate and distinct industry from that of mining.

Eighth—No growing trees of any kind whatsoever less than 8 inches in diameter are permitted to be cut.

Ninth—Persons felling or removing timber under the provisions of this Act must utilize all of each tree cut that can be profitably used, and must dispose of the tops, brush and other refuse in such manner as to prevent the spread of forest fires.

Tenth—These rules and regulations shall take effect Feb. 15, 1900, and all existing rules and regulations heretofore prescribed under said Act by this department are hereby rescinded.

W. A. RICHARDS,
Acting Commissioner.

Approved, Jan. 18, 1900.
E. A. HITCHCOCK, Secretary.

International Mining Congress.

TO THE EDITOR:—There have been up to the present time over 1000 delegates to the International Mining Congress, appointed by the Mayors and Governors, Boards of Trade and other business organizations, while over 100 mining engineers have up to the present time signified their intention of being in attendance at the Congress. We have been promised the Colorado State exhibit, as well as the Cripple Creek exhibit, and northern Wisconsin and northern Michigan are going to send a very extensive exhibit of iron and copper ore. From the present outlook the International Mining Congress of 1900 is going to be one of the most important conventions ever held in this country.

T. J. SULLIVAN, Sec'y.

Milwaukee, Wis., Feb. 8.

IT seems impossible to impress miners and prospectors with the danger of thawing dynamite. The last addition to the list is from Idaho, where two men were killed last week.

Masonry Dams and Retaining Walls.

NUMBER I.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE T. PARDOE.

The author, in the course of his experience, has often noticed the absence of knowledge concerning the main principles underlying the design of such works by men in foreign countries, the result being that such works, if safe, are often unnecessarily costly, or, on the other hand, great risks are often unwittingly taken.

Although the author has used the above double title, there is no essential difference in the principles involved in the design of either works, the principal differences being more in the direction of "construction" than of "design," and the ordinary work for which miners and similar persons would use retaining walls are not usually of such a character that a failure would cause very serious damage and, consequently, a lower class of material and design than would be admissable on a dam for holding up water, would often suffice. The author is, however, very strongly of opinion that, except for pure temporary purposes, the best work is the cheapest in the end.

In the case of a masonry dam for holding up water to form an artificial lake for the purpose of water conservation, the best work possible under the circumstances of the case should be used, and no care or material should be spared to ensure the absolute safety of the work, since it is costly in all cases, and a failure often causes serious damage, apart from the loss of water and interruption of the supply.

In order to save time and space, it is therefore the intention of the author to write only of the design of a masonry dam, premising that the same principles and methods may be also used for retaining walls.

The two main points which it is practically necessary to consider in the design are as follows:

1. That, whether the reservoir be full or empty, the line of pressure shall fall within the "middle third" at any horizontal section.
2. That the maximum intensity of pressure shall not exceed a certain safe limit for the material employed.

It is equivalent to laying down a rule that no tension shall exist in any part of the masonry. Well built masonry of good materials will stand a considerable tension, but of a practically indeterminate amount, and it is therefore safest to assume that it will not stand any tension.

Imagine that a horizontal fissure forms on the water face of a masonry dam and below the water line, through tension being caused by the line of resistance falling outside the "middle third" at that horizontal section. Then it is clear that the water pressure will exert a lifting action on the masonry above the fissure, and this pressure, being an additional force to that allowed for in the design, will cause the center of resistance to move towards the outer face, since the resultant of the forces is no longer that of water thrust and weight of masonry, but is that due also to the lift of the water pressure in the fissure, and it is obvious that the action once begun must continue until the dam is completely destroyed above the weak section.

According to Prof. Unwin this was the immediate cause of the failure of the Bonzy dam in May, 1895. (See Cassier's Magazine, Nov., 1896.)

The effect of fissures in masonry of all kinds are especially disastrous in tropical climates, since the growth of vegetation is so rapid as to ensure the destruction of any work to the interior of which roots are allowed to penetrate, and all vegetation should therefore be carefully removed from any important masonry work.

The first thing to consider in the design is the weight of the masonry per unit of bulk. (In this article English feet and decimals will be used.)

Light weight of stone usually corresponds to poor quality, and, as has been stated before, the best quality procurable is none too good for tropical work. The weight also varies with the proportions of mortar and stone, good rubble masonry usually having not much more than one-third mortar to two-thirds stone. The average of numerous works built of good stone and lime mortar in India and elsewhere is about 165 pounds per cubic foot.

The next point to consider is the limiting pressure on the masonry. For this no definite figure can be given, as everything depends on the workmanship of the masons and supervisors on the works, and also on the mortar employed. A safe estimate with lime mortar of good and suitable quality is 15,480 pounds per cubic foot.

Although it would open up too wide a field to consider "materials" within the scope of such a paper as this, which deals purely with a method of "design," it may be desirable to warn people to keep a very careful watch on the character of any lime supplied to them, and to reject all that there is the least doubt about. In Spanish-American countries and others in which the labor is of a slovenly character, almost anything may be expected where there is a possibility of a slight saving of trouble

As an example, the author had once to build a loading for a water wheel, and was much surprised that the lime supplied, while being absolutely non-hydraulic, developed practically no heat on slaking. It was subsequently found that the lime burners (native contractors) had found that quicklime was unpleasant to the feet, and therefore they said they were in the habit of pouring water on it, to cool it, when drawing it from the kilns.

A preliminary of the actual design must also be the determination of the depth of water at times of maximum floods, over the crest, assuming that the dam is to act as its own waste weir, which in most cases is economical, for on this, added to the height of dam, will be based the pressure of water against the dam.

It is also necessary to determine the top thickness of the dam. Now this is dependent on practical considerations only, such as the necessity of allowing for a roadway across the dam and freedom from cracking due to the sun's heat, a thick crest being less affected than a thin one.

A formula for the top thickness, which is, however, not by any means tallying with all practical constructions, is $T = \sqrt{H} + 2$ where T = thickness in feet, H = height in feet.

Next as to the pressures produced on the masonry by the forces in operation.

It is obvious that the weight of the masonry above any horizontal joint may be assumed to act in the vertical line passing through the center of gravity, and it is also obvious that if this line passes through the center of figure of the joint, or midway between its faces, the weight will be uniformly distributed over the whole joint, assuming (a) that the masonry is uniformly elastic and (b) that the figure is rectangular, which is correct in the case of a horizontal joint in a vertical slice of a masonry dam.

NOTE.—The term "joint" requires explanation. It is a convenient supposition for the purpose of design that a vertical slice is divided into a number of separate parts by horizontal joints, but special care must be taken in the actual construction that nothing in the shape of true regular joints shall be allowed to exist in the masonry as a whole.

If, now, a horizontal pressure be exerted against either face, the resultant force will no longer intersect the joint at the same point, but will be moved towards the face farthest from the face at which the horizontal pressure acts, and the angle at which it intersects the joint will be such that its sine equals the weight of the masonry, or, in other words, the vertical component of the line of pressure (or resultant, often called the "line of resistance") is always constant and equal to the weight of masonry above the joint, and therefore the amount of deflection in feet measured on the joint from the vertical line of gravity is proportional to the amount of pressure exerted in a horizontal direction.

retaining wall that when subject to no horizontal pressure the line of resistance falls to the inside of the center of figure, and that when the designed pressure is applied the resultant cuts the base at the center of figure, the advantage being that the foundation or joint is subjected to a uniform load. To obtain such a result in a wall for retaining a bank of earth is easy by the simple expedient of inclining the wall against the load, but in the case of a dam for holding back water the result can only be attained practically by a very massive design, an example of which is seen in the Vyrnwy dam, Liverpool water works.

The position of the center of resistance relative to the center of figure of any horizontal joint can be readily calculated by adding to the deflection of the resultant (as found in the foregoing rule) the distance from the face at which the horizontal force is applied to the vertical line through the C. of G., and from the sum subtracting the half-width of the joint at that place. The distance so found multiplied into the weight of masonry above is the moment producing bending stresses at the joint, and this moment is exactly equal to the product of water thrust and height of center of pressure.

For the sake of simplicity, the side of the wall or dam at which the pressure is applied will be called the "inner" face.

In determining the pressures on any joint it must be remembered that there are two forces at work:

(a) A bending stress (considering a vertical slice of the dam as a beam), the maximum stress at the faces being given by the formula $F = \frac{6P.L.}{T_2}$ where P = thrust applied and L = lever arm at which the thrust acts, and T = thickness of wall at the joints and F = maximum stress.

NOTE.—It will be seen that this formula is merely a simplified form of that for beams, and which is $\frac{1}{6}BD^2F = W.L.$ where B = breadth, D = depth, of beam; F = maximum stress; W = weight, L = lever arm bending moment.

It will be understood that these stresses are compression on the outside and tension on the inside when the center of resistance falls outside the center of figure (C. of F. in this case obviously coincides with center of inertia) of the joint.

(b) A direct downward pressure due to the weight of the wall and the mean value of which $= \frac{P_1}{T}$ and where P_1 = the total weight of masonry above the joint.

The resultant stress at any point = the algebraical sum of the two forces. For example, if F = 5 tons and $\frac{P^1}{T} = 4$ tons, the resultant stress will be

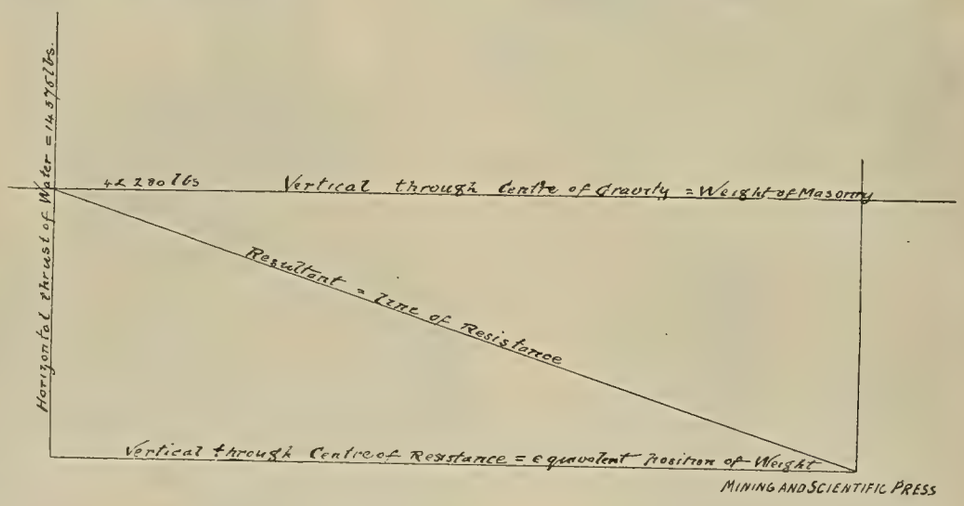


FIG 1 Scale — 80000 lbs - 1 inch

It will also be obvious, on reference to Fig. 1, that the tangent of the angle made by the resultant with the vertical $= \frac{\text{Horizontal force}}{\text{weight of masonry}}$, and also that the height of vertical line representing to scale the weight of masonry also represents the height of the center of pressure of water $= \left(\frac{\text{depth of water}}{3}\right)$ and that consequently the distance of deflection of the resultant measured on the joint from the line of C. of G. to the point at which the resultant intersects the joint which may be called the center of resistance is given by multiplying the horizontal water thrust into the height of the center of pressure $= \left(\frac{\text{depth of water}}{3}\right)$ and dividing by the weight acting through the C. of G.

Now, it is quite possible to so design a dam or

$5 + 4 = 9$ tons compression at the outer face and $5 - 4 = 1$ ton tension at the inner face.

As the method of design can be best illustrated by a concrete example, the author will now proceed with the design of a dam of the following dimensions: Height = 50 feet; thickness at top = N50 + 2 = 9 feet (assumed as a preliminary); weight of masonry (assumed) = 165 pounds per cubic foot; height of water over crest at maximum floods = 3 feet.

Now, the profile of such a dam can be calculated with more or less accuracy by rather elaborate formulæ, but the author purposes to show how it may be done with great simplicity and with sufficient accuracy for practical purposes by a trial and error system which has been actually used in the design of very important works, which have done their work satisfactorily for many years.

(TO BE CONTINUED.)

MINING SUMMARY.

ALASKA.

CAPE NOME.

(Special Correspondence.)—The experiment of hydraulic piping by C. D. Lane at Cape Nome will be interesting. He proposes to bring water under a head of 700 feet for hydraulic mining there. The extremely low temperature will necessitate a great velocity to prevent the water freezing in transit. The smaller the pipe the greater the friction, and without friction and velocity the water must necessarily congeal in the pipes. He has ordered $86,000 worth of steel-plate pipe from one San Francisco manufacturer.

Cape Nome, Jan. 10.

ARIZONA.

COCHISE COUNTY.

The Dos Cabezas Con. Mines Co. is putting new machinery on the mine. J. W. A. Off, of Los Angeles, is Pres.

There are thirty artesian wells in the St. David's district, above Benson, on the San Pedro river.

The Copper King of Arizona M. Co.'s smelter at Pearce will be put up and run by J. Williams.

GILA COUNTY.

Advices from Old Dominion mine state that a change in method of smelting is showing improvement in results. Only highest grade ores, running 10% to 13%, are being treated. At present oxide ores lower than 6% cannot be treated at a profit. With the sulphuret ores from the Continental mines, bought by the Old Dominion Co., added, the treatment of 3% ores will return a fair margin of profit.

Silver Belt: Messrs. Westmeyer and Andrus will begin the erection of a building for their ore sampling works at Globe as soon as the necessary lumber can be procured.

MOJAVE COUNTY.

W. H. Lake of Kingman will build a mill on the Colorado river for his mines this summer.

Miner: G. M. Bowers has purchased the interests of his partners in the Primrose, Todd Basin, and has men driving the tunnel ahead. Mr. Bowers will drive the tunnel 100 feet and sink a winze on the ore body. Machinery will be put on, as the mine is wet.

PIMA COUNTY.

The Gasman-Stratton group, in the Santa Catalinas, has been purchased by C. S. Condon, New York. G. E. Metz will be Gen. Mgr. and J. S. Scrivener Supt.

ARIZONA.

YAVAPAI COUNTY.

(Special Correspondence).—Prescott became the capital of the Territory of Arizona when it was created by Act of Congress in 1864, and continued to be such for many years, until the capital was removed to Tucson and subsequently to Phœnix. The lowest altitude of Yavapai county is 1200 feet, and it contains mountain ranges over 10,000 feet in height. It was to Yavapai that the first white settlers drifted from California in the early sixties, and located mines which have been worked more or less ever since. The advent of the Santa Fe, Prescott & Phœnix Railroad and the rise in the price of copper during the past two years have caused a revival in mining in Yavapai, like everywhere else in the Territory.

Prominent among the mining districts of this county is the Big Bug district, lying almost due east of Prescott, and which is reached by a short line of railroad which runs from Prescott to Mayers station, a distance of thirty miles. In the early days Big Bug was quite a producer of placer gold, which was superseded by quartz mining. The first quartz ledges were located in the early seventies and considerable activity was shown, the Christmas Gift producing in the neighborhood of $40,000 in gold. Owing to lack of transportation and the refractory character of the ores mining gradually died out until seven years ago, when a new era began, which has gradually improved until now it is estimated that 150 men are employed in the district.

The Poland mine, three miles from Providence, the postoffice of Big Bug district, is owned and being systematically developed by the Congress Gold Co. Nearly 6000 feet of development work has been done in the upper workings, and a tunnel is now being driven through the mountain to Lynx creek, a distance of 6000 feet; 125 feet have yet to be driven to reach a point where an upraise will be made to connect with the upper workings. No ore is being shipped. Within a few hundred yards of Providence is the Belcher mine, one of the oldest in the district, which was worked twenty-five years ago, when soldiers were obliged to guard the property from the attacks of Indians. A gasoline hoist is being put in. Adjoining the Belcher is the Red Rock mine, owned by Californians, upon which a 40-ton steam stamp mill is reducing the ore. East of Providence is the Sterling, being developed by Ohio capital. Across the gulch is the Lottie, in which Jamestown, N. Y., capital is interested. All of these properties are paying.

Between Providence and Mayers is situated the Henrietta mine and a 20-stamp mill, ten stamps of which are running day and night. This property is under bond to Eastern parties. Near by is the Commercial smelter, as it has for a long time been known. It was erected ten years ago and has treated the gold, copper and silver ores of the district. It is at present the property of Phelps, Dodge & Co. of New York, but has been leased to the Arizona, Eastern & Montana Co., who have repaired the plant and who, within a few weeks, will be in readiness to treat ores as heretofore. A new furnace is contemplated.

Two miles across the hill is the town of McCabe. The McCabe mine has the deepest shaft in the district—700 feet. Sixty men are employed on this mine. At present fifteen carloads of ore are shipped per month to the Silver City smelter at a cost of $6 per ton for railway transportation.

Within a mile of the McCabe mine is the Dividend M. & M. Co., composed of Los Angelenos, who have opened up an ore body. Near by is the Little Jessie, an old property taking on new life. North of Huron station is the Lone Pine mine, which has produced $30,000 since Nov. 1st, '99, and which was bonded to H. B. Clifford & Co. of New York, who have transferred their bond to a syndicate for $85,000. All of the payments have been made except the last, which it is said has been anticipated and is now on the way to Geo. Rohpeter, the owner.

Four miles below Huron station, with a sidetrack of a mile, is the Val Verde smelter, owned by Boston and English capitalists, under the management of Cecil G. Fennell. This plant has a capacity of 200 tons per day and has been constructed during the past five months, the machinery having been put in by the Colorado Iron Works of Denver. It is admirably situated on the Agua Fria river and has unlimited water. It is equipped with automatic dumping appliances and labor-saving machinery, and has bins capable of holding 1000 tons of ore. A number of good buildings have been erected upon this company's property and they expect to open up for custom smelting within the next few weeks. This company also owns a group of copper prospects in the Grand Canyon of the Colorado, fifty miles from Williams, from which they expect to obtain much of their ore.

What Yavapai county needs most is a pyritic smelter similar to the one in Silver City, New Mexico, to handle the rebellious ores with which this county and Mohave county are filled, and which are being successfully treated at Silver City. The Val Verde people are contemplating the construction of such a furnace, and if they do it will prove a profitable investment to them as well as a boon to the miners of this vicinity. Twenty miles from Mayers station is the Crown King mine, which has been a large producer for years. A few men are working there. The mill is shut down owing to litigation, which has handicapped this property for years.

At Mayers station—named after Joe Mayers, who has been located here for the past seventeen years—is the largest onyx bed in the world. Hundreds of tons of onyx have been shipped to Chicago, New York and Kansas City. Prof. Morril of the Smithsonian Institute at Washington has examined this property and says it has no superior on the continent. It was sold five years ago to a New York company and the superintendent is expected to arrive here in a few days to arrange about working it. Four miles from Mayers is situated the Blue Belle copper mine, owned by Senator Addicks of Delaware. It is reported that this mine has a body of 47 feet of ore running from 6% to 8% copper and containing streaks of gold assaying $4 per ton. Extensive reduction works are contemplated on this property.

Prescott, Feb. 13.

(Special Correspondence).—The Grand Gulch mine, seventy-five miles south of St. George, Utah, belonging to Jennings Bros. of Salt Lake City, is shipping a carload a week of high-grade copper ore, which is hauled about 150 miles to the Oregon Short Line Railway.

The Savanic, four miles from the Grand Gulch, recently struck a good grade of copper, having shipped one car.

St. George, Feb. 6.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—The Standard Electric Co., whose power house on the North Fork of the Mokelumne river near Mokelumne Hill was recently destroyed by fire, will abandon its old ditch and build a new one twenty miles long, capable of carrying 10,000 miners' inches of water, conveyed to a power house three miles above the site of the burned works. Here a vertical fall of 1400 feet will be obtained, capable of generating 15,000 H. P. Besides the new ditch, an "insurance reservoir" will be built at the head of the ditch capable of holding sufficient water to run the works for at least sixteen days in case of accident at the head gate in the river. A road has been graded to the new power station, and 500 men will be put to work on the ditch line and reservoir. C. H. Elison is superintending affairs.

Jackson, Feb. 14.

BUTTE COUNTY.

The Cherokee Flat hydraulic mine, comprising 160 miles of water ditches, 30 miles of debris canals and 1500 acres of patent channels, has been sold to a syndicate of Pittsburg and Washington men for $250,000. The mine is above Oroville.

CALAVERAS COUNTY.

(Special Correspondence).—The quartz crystals brought to the surface at Mokelumne Hill have attracted wide attention and there is a future for the industry of gathering these remarkable specimens. The crystals are found in the Green Mountain gravel mine, two miles south of Mokelumne Hill. They had been taken out by the early workers in this mine and thrown aside as valueless. The matter was brought to the attention of J. E. Burton of Wisconsin. He was impressed with the value of the crystals and conferred with Tiffany & Co., jewelers of New York, relative to their use in the business of that firm. He was assured that large quartz crystals were rare and valuable. Mr. Burton bought the Green Mountain mine, chiefly for its value in crystals, put men to work; took out of the mine several tons of the crystals and shipped them to Tiffany & Co., who were employed, for 20% of the price realized, to cut them into such forms as would make them most salable. Tiffany & Co. have in the main turned them into balls. The collection is still unsold and is valued by experts at $17,000. One of the largest of the balls is 7½ inches in diameter but is not entirely flawless; another, 5½ inches in diameter, has no flaw, and this one is valued at $3000. The collection is to be taken to the Paris Exposition and there made a prominent part of the Tiffany display. It is expected that numbers of these crystal balls, which are like distilled water petrified, will attract much attention, arranged upon a piece of petrified ebony also in the Tiffany display. It is more than probable that the crystals will find purchasers at high figures during the Exposition. If so, and if the sale of other specimens at largely remunerative prices is assured, Mr. Burton will resume the work of taking them out of the Green Mountain mine. At present the mine is being worked as a hydraulic proposition at another point of the channel, and, as such, the enterprise is paying well.

G. F. King, of the U. S. Geological Survey, and also the expert for Tiffany & Co., devotes a chapter in his last Government report on precious stones to a description of these California crystals. He goes on to say that "the specimens are found in the compacted filling of one of the old river channels that are so marked a feature of California geology. They are described as lying in every sort of position in the old filling. Some are close to the rim rock, or ancient river bed, embedded in coarse colored gravel and cement, stained and discolored externally, but in some cases clear and brilliant within. Over the rim rock is a cream-colored clay, and then a coarse, wet sand, much compacted, in which are found clean, handsome-looking crystals, though all are muddy and require thorough washing. Two stopes or drifts have been run into this deposit for several yards, and the sides, faces and roofs are seen to be full of crystals." Mr. Kunz also says: "This is an interesting and promising addition to American minerals, available in the ornamental arts, as hitherto only occasional pieces of rock crystal possessing sufficient size and transparency to serve for such purpose have been found in the United States. Japan, Brazil, Madagascar and the Alps have hitherto been almost the only sources. It will be an interesting geological problem to ascertain the origin of these grand crystals now strewn in the old channel. As they are not much rolled and lie so thickly in a limited space, it seems that they can not be far removed from their point of ocrence, and the suggestion arises that some cavern or open vein lined with the crystals has been cut through by the ancient stream, and perhaps entirely obliterated, near the spot where they are now found."

(Special Correspondence).—The Utica M. Co. has its electric power house near the town of Murphys. The company has power in reserve. Water is taken from the company's ditch with a perpendicular fall at the power station of 580 feet. At present there is but one 48-inch Pelton wheel, which runs a single K. W. generator, capable of yielding 1000 H. P. A second generator is to be put in. The supply of water to the wheel is regulated by an electric governor, maintaining uniform speed of 400 revolutions per minute. Since the machinery started, Nov. 10th, '99, there has been no stoppage on account of accident or for repairs. The company furnishes power and light to several enterprises. It transmits energy to Jackson, Amador county, fifty miles from the power house.

Work goes on at the Sheep Ranch mine, which is being reopened by a new company, whose stockholders are mainly San Francisco business men. The mine had filled with water within 100 feet of the collar of the shaft, from which it was drained off by a tunnel. The work of unwatering was done with the hoist, which began baling last August. About 35,000,000 gallons of water were taken out, when men began to retimber to the 300-foot level. At present buckets are used to hoist ore, etc., but it is proposed to lay T-rails in the shaft and thereafter to use skips. The shaft is 1200 feet deep. Ore is being taken from the 1100-foot level. There is a new 20-stamp mill, run by steam. An old ore dump is being put through the mill. The ore does not furnish much value in sulphurets, and no ore concentrators have been procured, though there is a place for them in the new mill; they will be added later. Besides the large double steam hoist, there are stationed here two vertical air compressors. Everything is run by steam; wood costs $4 to $5 per cord; no water power is available. The company runs a 180-light dynamo, supplying electric lights for its own use and for the town of Sheep Ranch. The plant will ultimately include a pump, as the mine makes considerable water. V. S. Garbarini is Supt., J. T. Langford Asst. Supt. and accountant, Louis Bohnes mine foreman.

Lewis Emery, near Mountain Ranch, ten miles west of San Andreas, owns for two miles along an ancient river channel and has invested several thousand dollars in preliminary operations. He has built three miles of ditch and laid a 30-inch steel pipe line 6400 feet to a point where it branches into two 16-inch lines, one of these lines going 4000 feet south to the Motto claim, the other 1½ miles northwest to the Rose Hill claim. At the former he gets a vertical fall of 400 feet; at the latter, 285 feet. Mr. Emery works under permit of the Debris Commission, and thoroughly impounds the tailings on his own ground. Two No. 6 Little Giants will play against the bank at the Motto claim, where bedrock tunnels, etc., have been constructed. Last year 30,000 cubic yards of earth were moved at the Rose Hill claim with good results.

There are several other gravel properties in the same portion of the county which might be profitably worked if water was available.

The gravel claims near Mokelumne Hill are attracting some attention. The Green Mountain mine, at Chile gulch, is working along in a modest way under the management of J. E. Burton, who represents Milwaukee, Wis., men. Here the supply of water is 500 inches, discharged through a monitor under pressure of 270 feet, vertical. He is also developing the Comanche gravel claim, in the Mokelumne Hill district.

The North Star gravel mine, owned by P. L. Shuman and Gustav Baumann, and under the superintendency of Ed Baumann, is another leading gravel proposition in this district. The owners control two miles of channel. From results obtained through tunnels run into the auriferous gravel, it is considered to be a good property.

At the Ellen Vannon drift mine, near the North Star, a tunnel has been run 400 feet, where gold-bearing gravel has been obtained. The gravel is run through an 8-stamp mill, and in a recent working 110 tons yielded $540. The twelve men employed are mainly prosecuting development work. The mill is run by water power, under 160-foot pressure, a 2-foot Pelton wheel being used. The gold from the gravel is caught almost entirely upon two tables, each 4 feet wide, 12 feet long, set below the batteries and corresponding to the plates in a quartz mill. Six trenches, 2 inches deep, extend transversely across these tables, in which quicksilver is placed. Nearly all of the gold is caught in the first three trenches. W. J. Jackson is Supt. and part owner of the Ellen Vannon, with English associates.

Besides the gravel properties which J. E. Burton is developing in the vicinity of Mokelumne Hill, in a quartz claim at French Hill is being driven a tunnel to tap numerous veins; it is now in 350 feet. T. E. McSorley is Supt.

The Foote & Thompson, or Quartz Glen mine, five miles east of Mokelumne Hill, is

a property likely to be heard from. Chicago men have a bond on the mine. At least $300,000 were taken out of this mine in former years. There are two well-timbered tunnels running in on the ledge, aggregate length 2000 feet. The upper tunnel gives 240 feet of backs, the lower 700 feet. Very little stoping has been done. There is a 20-stamp mill on the property, which can be run by water under 700 feet pressure from a pipe line.

J. K. Carpenter, representing Eastern men, has been examining mining properties near Mokelumne Hill. His method is different from most operators. Instead of bonding claims, he buys outright for cash. He recently bought the Cramer mine.

At the Calaveras, formerly known as the Lucas mine, on the river near Mokelumne Hill, ore is taken from a tunnel and carried in cars by mule power to a 10-stamp mill on the opposite, or Amador, side of the Mokelumne river, the stream being spanned by a bridge suspended from wire cables. Hoisting works are about completed on the hillside above the tunnel and a shaft is being sunk.

Power is furnished through turbine wheels under 15 feet fall, the water being taken from the river a short distance above. One 30-inch wheel runs the stamps and another about the same size will run the air compressor, from which air will be conveyed 1400 feet through a pipe line to the mine. Twenty-two men are employed at the Calaveras; P. Houghton is Supt., E. M. Houghton foreman.

At the Ford mine, near San Andreas, the mill will soon start up. Here the hoist and air compressor are run by steam, the mill by electricity from the Standard Co. W. Knight is Supt.; L. Guerne is Sec'y and assayer. The stockholders are mainly New York people.

The Fellowcraft or Veritas mine, adjoining the Ford, is to be started again by a new company. J. M. Lively of San Francisco, who represents Eastern stockholders, is getting matters in shape to pay off old liens and to start with a clean score. Local faith in this mine is very strong. There is a good 10-stamp mill on the property, a good hoist and the shaft is 200 feet deep.

An excellent showing has been made at the Commodore mine, one and one-fourth miles northwest of San Andreas. Work began Aug. 1, '99. The shaft, which follows the foot wall at an angle of 75°, is now down 300 feet. At the 200 level a crosscut showed the ledge to be 8 to 10 feet wide; at 300 feet it is 17 feet wide. There is a 60-foot drift at the 200 level and a 50-foot drift at the 300 level. Within a few months the present steam hoist will be replaced by a larger one and a 20-stamp mill built to be run, without doubt, by electric power. W. H. Clary, Jr., is Supt.

W. B. Swank is opening up the old Oro Fino mine, now called the Pilot, located near Cave City, ten miles east of San Andreas. He is building a 4-stamp mill, which will be run by water brought through a ditch two miles long from McKinney's creek. He will get a pressure of 100 feet, and expects to crush twelve tons per day with his four 900-pound stamps.

The Gwin mine, the last property visited in Calaveras county, is one of the famous mines on the mother lode, and has been often described. The vertical shaft is 1656 feet deep. The old incline shaft is 1450 feet, the two shafts being connected at the 1400-foot level. The 80-stamp mill has space reserved for twenty additional stamps. There are thirty-two concentrators. The sulphurets are shipped. Water is the motive power, and there is a vertical fall at the wheel of 400 feet. The air compressors are one mile down the creek, where there is a pressure of 200 pounds to the square inch, the water being used after doing duty at the mill. The 16-foot wheel acts directly upon the air compressors, being hung on the main shaft. Nearly 200 men are employed at the Gwin.

The Melones G. M. Co. holds a special meeting March 7th to take action on a proposition to increase the capital stock by an issue of 35,000 shares of preferred stock to $2,350,000, the new stock to be entitled to 12% dividends and to be disposed of at not less than par—$10 per share.

San Andreas, Feb. 10.

Citizen: In the Commodore mine, Supt. Clary has cut through the ledge, after drifting along it for 125 feet, and, after crosscutting from the 300-foot level, found the ledge to be 26 feet wide, assays being satisfactory to the management. Drifting on the vein has been resumed. These explorations are made with the view of testing quality and quantity of the ore, and will be the guide in the size and character of the mill to be erected during the spring.

EL DORADO COUNTY.

Gazette: The Esperanza mine, Garden Valley district, is about to resume operations, with Robert Harrop as Supt.

FRESNO COUNTY.

A railroad from Fresno to King's River canyon is projected by the Copper Mountain M. & D. Co. There is a proposition to bond the mines for $500,000 and develop them, in which case a railroad about sixty-five miles in length would be built from the mines to Fresno.

INYO COUNTY.

Register: The Bradford rotary mill is in full operation at Borin, in the Slate range.

KERN COUNTY.

Reporter: J. B. Treadwell will build a 4-inch pipe line four miles long, to conduct water to the river oil district and connect with distributing tanks.

SAN DIEGO COUNTY.

The annual stockholders' meeting of the American Girl M. Co. at Yuma elected H. H. Markham president and F. S. Daggett treasurer.

The discovery of mica near Tacumba, on the edge of the Colorado desert, is reported. The ledge is said to be 30 feet wide.

SISKIYOU COUNTY.

The new mining dredger at Hawkinsville has been launched and will be ready to work in June.

Journal: The Greenhorn Blue Gravel No. 2 Co. has bought the Nehrbass place for $2900 and will start work April 1st.——The hydraulic mines of Oro Fino are being worked energetically.——L. T. Williams has bonded his mine on Humbug.——A force of ten men are prospecting the Schroeder mine, on Deadwood, with the intention of commencing operations on an extensive scale. The new owners have expended $100,000 in development.

News: At the Sheba mine, Patterson creek, a 500-foot shaft will be sunk.

TUOLUMNE COUNTY.

(Special Correspondence).—It was the impression for several years that Tuolumne county was a pocket mining region, but in the past three years many old mines in the east belt have been reopened with promise of permanence and value,

Confidence, six miles north of Soulsbyville, has been almost entirely rebuilt, and is the result of reopening the old Confidence and other mines in that neighborhood.

Arrastraville and Cherokee, three miles east of Soulsbyville, have doubled in population in the past two years, the result of opening mines. Carters has doubled in size the past year. There are several mines being opened near there; it is also the terminus of the Sierra railroad. At the Big Oak mine, in the Soulsbyville mining district, the 30-stamp mill is running steadily. The sulphurets are shipped to the Selby Works in San Francisco. With the cyanide plant 95% of the gold is saved. The above company owns the Live Oak and Carra mines on the south, and have lately made several payments on the Lander Ranch and Jumbo mines on the north.

The South Extension Black Oak mine, owned by J. D. Sullivan & Co., has been opened by a tunnel. A winze is being sunk from the tunnel; the vein is of good size. Mr. Sullivan says machinery will be placed on the mine and sinking continued.

The pump was recently lost at the Draper mine, and the shaft, which is 300 feet deep, may be retimbered. Steam power is used on this mine. This vein is in the granite and near the Black Oak. About $1,500,000 in gold was taken out when worked years ago.

T. Pickle, who had the Trevithick under bond, forfeited it to the owners, who have begun work and have opened a 2-foot vein of ore.

Soulsbyville, Feb. 12.

New Era: Ten stamps will be added to the Longfellow mine mill. A cyanide plant will also be placed thereat. The mine is under the superintendency of T. F. Coyle.

COLORADO.

BOULDER COUNTY.

The option at sixty days asked for by a Boston syndicate on the Big Five at Ward, for $3,000,000, was last week denied. The extension of time applied for was also denied.

CLEAR CREEK COUNTY.

Georgetown proposes organizing a home pool to work the idle silver mines in that locality. The idea has been carried on in Gilpin county for a good many years, and has worked well.

EL PASO COUNTY.

Record: A great deal of development is being done on the Clyde claim, adjoining the Modoc and Last Dollar on Battle mountain.——Michigan men, represented here by L. H. Johnson, have secured a fifteen months' lease on the south end of the Kentucky Belle. They will commence work at once.——A. E. Stevens has been appointed Mgr. of the Golden Hub and Chesapeake & Cripple Creek companies.

GILPIN COUNTY.

Henry Bolthoff, of Denver, will put one of his improved hoists on his mine, the Mechanics' Lode.

One or more new concentrators may be built at Central City.

The Whitcomb stamp mill in Nevadaville was recently burned. The property is owned by the Vendome Co. Loss about $5000.

Register-Call: A new office and assay office have been erected at the Crown Point & Virginia mine for the California & Colorado M. Co.——A whim has been placed on the Colfax mine by the Bertha M. & M. Co.

LAKE COUNTY.

Among the gold belt properties that are gaining in prominence are the Fortune and Penfield group bought by L. C. Ferree of Denver.

The Home Mining Co., of Leadville, has secured extensions of its leases for ten years. The mines are now outputting 350 to 400 tons a day, netting $4 per ton.

OURAY COUNTY.

The building of a smelter for the Saratoga group at Red mountain is now an assured fact.

W. C. Wrisberg of the American G. M. Co. says at the American-Nettie work on the proposed improvements will be commenced immediately. The new mill will be a 20-stamp mill with room for ten additional stamps.

SAN JUAN COUNTY.

C. C. Pierce, of Indianapolis, will make test shipments from his mine in Burrows Park district, and will erect a mill at Eureka. R. L. Ray, Lake City, is Mgr.

The Saratoga Mine Co. will build a smelter this year. L. E. Fry has charge of the company's properties.

TELLER COUNTY.

St. Louis, Mo., men have bought the Brown Leghorn, Monarch, North Star and Silver State claims, comprising thirty acres of territory on Globe hill, for $140,000.

IDAHO.

BOISE COUNTY.

The Iowa group of mines at Quartzburg has been sold by D. Coughanour for $10,000 to Boston men, who will begin work next month.

ELMORE COUNTY.

The Pennsylvania Placer Co. at Pine Grove has spent nearly $10,000 in development. This company owns 5200 acres of land, 2000 acres of which is channel gravel from 60 to 90 feet in depth. Tests so far give a value of 30 cents per cubic yard.

IDAHO COUNTY.

(Special Correspondence).—The Midas G. M. Co. of Spokane, Wash., principal stockholders Campbell and Finch, have reached a depth of 115 feet on their Ajax claim, and another crosscut will be made and drifts started east and west. The shaft is in free milling gold ore and a crosscut at 60 feet below collar of shaft showed 18 feet width, carrying values for entire width. The ore is soft and oxidized, and can be mined and milled for $2.50 per ton, according to manager's statement. The company will erect a large mill and hoisting works on the property at once. Dixie is twenty-seven miles southeast of Elk City, and eighty-two miles from Stuart, which latter place will soon be the terminus of the M. R. Ry., Clearwater extension. It is on the south slope of Salmon River mountains, about three miles from the summit of watershed between the Salmon and Clearwater rivers. The general formation of the district is archean granite, with porphyry and diorite dykes. The camp lies at an altitude of 5300 feet above sea level, is well timbered and watered.

The richest ore ever found in Idaho has been uncovered about one and a half miles northeast of Elk City. The claim is on the west side of American river and is parallel to the Blue Dragon and Red Stone leads. The vein has been crosscut at a number of places for a distance of 200 feet and in all shows high grade, free milling gold ore. In one hole, 6 feet in depth, is exposed 12 inches of quartz that is literally one-half gold. Out of this shaft the owner has sacked over a ton of ore. It is estimated that all of this is worth $10,000 per ton. The owner has at various times pounded out from three to eight ounces of gold in a hand mortar in half an hour. The owner is driving a drift to cut the vein deeper.

The Hillside group of claims on Big creek, adjoining the Gold Bug, is under bond to a Chicago firm, and development work will be started at once in charge of E. F. Gordon, one of the owners.

Grangeville, Feb. 15.

The bunk and store houses of the Buffalo Hump Syndicate were destroyed by fire, with a 10-stamp mill and sawmill stored therein. Loss, $15,000.

SHOSHONE COUNTY.

A bond on the Paymaster, Lost Wonder and Clear Grit claims has been secured by J. Porter of Spokane; consideration, $40,000.

WASHINGTON COUNTY.

At the Decorah mine, in the Seven Devils, Mgr. Hancock is using a diamond drill.

MONTANA.

DEER LODGE COUNTY.

Engineers have been examining the Madisonian group for Montreal men.

MADISON COUNTY.

E. L. Shafner has made an examination of the properties of the Lake Shore M. Co., near Sheridan, and says that the company will erect a 20-stamp mill at the mine in the spring.

Inter Mountain: F. Harrington and other Butte men have bonded the Majestic group of mines near Pony and are developing. They will erect a mill in the spring.

SILVER BOW COUNTY.

The Boston & Montana mine claims to have ore in sight, blocked out, exceeding 2,000,000 tons.

NEVADA.

ELKO COUNTY.

(Special Correspondence).—The Dexter G. M. Co. milled 30,033 tons of ore in 1899 by stamps and amalgamation and treated 19,100 tons of mill tailings by cyanide, the proceeds from all amounting to $188,900, with an expense account of $120,000. The mill has forty stamps. The ores come from 50 to 250 feet in depth.

Tuscarora, Feb. 5.

The management of the Tuscarora Chief, at Tuscarora, has decided to resume work.

HUMBOLDT COUNTY.

R. J. Lang, Supt. Rabbit Hole sulphur mines, near Humboldt House, says that his company is taking out eight tons of sulphur daily.

LINCOLN COUNTY.

(Special Correspondence).—A. W. McCune, of Salt Lake City, is preparing to erect a cyanide reduction plant, at Deer Lodge, in the State Line district.

State Line, Feb. 7.

NEW MEXICO.

BERNALILLO COUNTY.

New Mexican: The Victor group, owned by a syndicate of Santa Fe Railroad Co. conductors, has been bonded to W. J. Cartan. M. J. Sherlock has bonded to J. C. Flournoy five of his mining claims.

GRANT COUNTY.

The Pinos Altos G. M. Co. is increasing its mine force in order to supply its new mill with ore. B. B. Thayer is Mgr.

LINCOLN COUNTY.

New Mexican: New York men have bought the Boston Boy, north of the Old Abe, at White Oaks, and are negotiating for the purchase of the South Homestake mill.

RIO ARRABA COUNTY.

J. K. Turner, one of the early cyanide workers in the West, is Mgr. for the Copper Hill M. Co. at Renconda.

SANTA FE COUNTY.

J. W. Fleming, mine inspector for this territory, has completed a tour of the coal mines in New Mexico, and in his opinion the output this year will be greater than last.

OREGON.

BAKER COUNTY.

E. J. Godfrey, of the Red Boy mine, says it is intended to sink the shaft 2500 feet.

The Sumpter Con. G. M. Co. has incorporated; R. Koerner, T. I. Richards, O. S. Olson; capital stock, $100,000.

A new strike has been made in the Golconda mine at the 200-foot level. The monthly payroll is $8000. J. G. & J. T. English are owners. Geo. Robinson is millman.

JACKSON COUNTY.

The Montreal & Oregon M. Co., which recently bought the Ashland group of claims for $125,000, contemplates the building of a 10-stamp mill when the lower tunnel and the west shaft on the 250-foot level meet. C. D. McDonald, Ashland, is Supt.

JOSEPHINE COUNTY.

J. B. Scott, who bonded the Messenger mine, is having ore tested preliminary to building a mill.

The Chicago men who bought the Old Channel mine, on Six-mile creek, and connected it with the Illinois river by ditch, have started piping with one giant.

SOUTH DAKOTA.

LAWRENCE COUNTY.

J. H. Ahern, Sec. Hardin M. Co. and Chicago & Two Bit M. Co., has been in Deadwood inspecting the company's property.

In the mining district embracing Cen-

tral City, Black Tail and Garden City, there are five mills equipped with modern cyanide plants to treat refractory tailings.

Review: The Esmeralda mine, in Blacktail, has been sold to a Boston company, which will enlarge the mill and increase development.

PENNINGTON COUNTY.

On Rapid creek the Copper Cliff Co. has bonded a group of claims and begun extensive development. Mr. Florhman is Gen. Mgr.

UTAH.

The report comes in of alleged tin discoveries in the Uintah mountains, in the northeast corner of the State.

BEAVER COUNTY.

(Special Correspondence).—The Copper Mountain Copper Co. has a 200-foot shaft, from which drifting has been done on the ore body. This is strictly a copper proposition, and Lessee C. H. Smith reports that he will make a shipment this week. It is believed the ore will average 10% copper. Dr. M. N. Buck of Salt Lake City owns the majority of the stock.

Frisco, Feb. 3.

BOX ELDER COUNTY.

(Special Correspondence).—The old Ashbrooke mine recently put in steam hoisting and pumping equipment. The shaft will be sunk deeper and other development prosecuted. The property belongs to the Salt Lake Mining & Improvement Co, of Salt Lake City.

Bingham, Feb. 8.

JUAB COUNTY.

(Special Correspondence). — The Sunbeam, one of the first locations in the Tintic district, is making small weekly shipments. Mgr. A. Buckbee states that development work and sinking proceed on a larger scale this year. The property is on a well-known ledge of the eruptive porphyry section, which is traceable 4000 feet. It is believed some big mine will yet be opened on this ledge and there are numerous locations. Ore of the value of $60,000 was shipped from the Sunbeam last year. It ran about 10% copper, thirty to fifty ounces silver and small values gold.

Eureka, Feb. 10.

(Special Correspondence).—The Bullion-Beck mill is to be remodeled and provided with new equipment of a character that best befits the process required.

Eureka, Feb. 14.

Republican: Work has been resumed on the Snowflake property under the management of W. Hatfield.

PIUTE COUNTY.

(Special Correspondence). — The Annie Laurie of the Bald Mountain M. & M. Co., fourteen miles from Marysvale, is working with a force of thirty men and making some shipments of ore. This property is bonded to a Pennsylvania party, the amount named being $310,000, and the time limit May 1.

Marysvale, Feb. 13.

SALT LAKE COUNTY.

(Special Correspondence).—The Columbia Copper M. Co. are running three drifts from the main crosscut tunnel, on their property in Bingham canyon. One drift, at right angles to the tunnel, goes in 400 feet. About twenty tons per day are being milled at the Rogers mill, which concentrates fifteen tons to one ton. The ores run about 2% copper and the concentrates 24% copper, $3 gold and silver and 15% iron excess. The ores carry about 85% silica, which is pretty thoroughly elimininated by the concentrators. The property is owned by five stockholders, F. B. Cook being Mgr. WASCOTT.

Bingham, Feb. 9.

(Special Correspondence).—The Fortune M. & M. Co. have nearly completed their 100-ton concentration mill near Bingham. It is being equipped with crushers, rolls and concentrators and will doubtless be operating in a few weeks. The ores in the Fortune are copper and lead sulphides, with good values in gold and silver.

Bingham, Feb. 12.

At 270 feet depth the West Mountain placer encountered bedrock. Pannings show a plentiful presence of nuggets, some as large as wheat kernels.

SUMMIT COUNTY.

(Special Correspondence).—The Silver King paid a dividend of $75,000 on the 10th inst., and is said to have rich ore reserves of such dimensions as to assure continuous profits.

Park City, Feb. 12.

TOOELE COUNTY.

(Special Correspondence).—The Bunker Hill mine, near Stockton, has a shaft 250 feet deep and has produced about 700 tons of silver-lead ore, which ran high.

The Lion Con. mine paid off $6500 as a balance due on the bond Jan. 1st, and are now proceeding to erect buildings and put in hoisting machinery, preparatory to sinking a new shaft. Present workings are by means of an incline 500 feet long. The plans are to erect a concentration mill.

Stockton, Feb. 9.

(Special Correspondence).—The Chloride Point mill at Mercur is treating from twenty-five to thirty tons of ore per day, the average values extracted being from $13 to $14 per ton. The process is so regulated as to use only about one pound of cyanide to the ton of ore. These ores carry good silver values, as well as gold, and they are extracting about 70% of the silver values and practically all the gold. The good results attained are due to the efforts and skill of M. D. Stackpole, Supt., and Prof. Wm. Orr, agent of the MacArthur-Forrest process.

Mercur, Feb. 13.

(Special Correspondence).—The Overland cyanide plant will doubtless be enlarged this year. Mgr. Duncan has been East to arrange for this project with the principal stockholders.

Sunshine, Feb. 14.

(Special Correspondence).—The Honorine mine, near Stockton, is being started again under the directions of Scheu & Kimberly. A new compressor is being put in, to be used in pumping. The water will be taken from the shaft that sinks from the tunnel. Later a hoist will be set to work underground. E. J. Raddatz is superintending the work.

WASHINGTON COUNTY.

(Special Correspondence). — The Dixie copper mine, near St. George, is reported sold to St. Louis and New York parties for $220,000, B. T. Lloyd, of Salt Lake City, having negotiated the sale. The property will be further developed. A small smelting plant goes with the property, which is said to have produced $300,000 worth of copper.

St. George, Feb. 14.

WASHINGTON.

FERRY COUNTY.

The management of the Merrimac announces that a hoisting plant is to be placed on the property.

After various long continued experiments, the Republic Co. is satisfied that the ore must first be roasted and then leached.

FOREIGN.

BRITISH COLUMBIA.

Rossland reports the discharge of 100 men by the Le Roi M. Co., and the announcement comes from Nelson that the Hall mines and smelter had also shut down, on account of enforcement of the eight-hour law for underground mining. Following so quickly after the partial shut-down of the War Eagle and Center Star, these further cases of cessation of mining operations have created dismay in both mining and business circles. Unfortunately, too, there is said to be a probability of still other instances of wholesale discharges and shuttings-down before the middle of the present month.

The Bosun, in the Slocan, has closed down and Mgr. Sandiford will go to England to remain until the labor difficulties reach a settlement.

The second payment of 10% of the $30,000 bond on the Hartney, on Silver mountain, near New Denver, has been made. Rochester, N. Y., men are developing the mine.

MEXICO.

Oasis: All property of La Compania Union Minera is sold to C. A. Meeker and associates of Kansas City and St. Joe, Mo., for $120,000, American money.

Industrial Notes.

—Arizona is sending cavalry horses to South Africa.

—The extensive use of zinc shingles in the United States seems probable.

—Baker City, Or., has voted $100,000 bonds for a gravity water system.

—The Colorado Midland Railway has a snow plow weighing 144,500 pounds. It cuts a swath 14 feet wide.

—Salt Lake City, Utah, is going to buy two miles of water pipe, 30 to 36 inches diameter, for use in a new gravity supply main.

—Atchison, Kansas, is about to drill for coal. It is thought commercial veins of coal underlie the section at 600 to 1000 feet depth.

—The date set for the first operation of electric passenger and freight cars between Seattle and Tacoma, Wash., is Aug. 1, 1900.

—The Canyon City extension of the Florence & Cripple Creek Railway is in connection with the Denver & Rio Grande at the former point.

—Deputy Consul-General Hardy writes from Mexico that land suited to the growth of rubber can be had anywhere from $1 to $15 per acre. The titles are vested in private ownership.

—Pueblo, Colo., smelters are handling considerable Mexican lead ore. The U. S. Government gets no revenue from these importations of lead, for the ore is treated in bond and then shipped out of the country.

—Los Angeles, Cal., reports probability of another transcontinental railroad, from Mojave east by north through southern Nevada into Utah, the builders to be the Santa Fe, Southern Pacific, Rio Grande Western and Union Pacific. The Carson & Colorado line is designated as the link for the proposed new route.

Personal.

THOS. COUCH of Montana is in California.

SAMUEL NEWHOUSE returns to Salt Lake soon.

WM. ORR has returned to Salt Lake City from California.

W. E. MORROW is the new Supt. Yak tunnel, Leadville, Colo.

PRES. DERN of the Mercur, Utah, M. Co. has gone to Europe.

E. MCCARRICK is new Mgr. Plymouth Rock Co. in Tintic, Utah.

J. W. NEILL of Salt Lake City, Utah, has returned from Boston.

J. C. JENS has returned from Mariposa Co., Cal., to San Francisco.

GEO. E. BATEMAN is Supt. Black Spider mine, near Keswick, Cal.

R. G. LEGG is Mgr. Dexter M. Co.'s mine and mill at Tuscarora, Nev.

PETER DOYLE of Cripple Creek is examining mines at Marysvale, Utah.

GEO. WAUGH has been appointed Supt. Portland mine, near Deadwood, S. D.

T. SYMINGTON is superintending work at the Atlas mine, near Tuttletown, Cal.

L. S. AUSTIN will be Supt. and metallurgist for the smelter at Cerillos, N. M.

JUDGE KINLEY of San Francisco has been in San Andreas, Cal., on mining business.

HOWARD BAXTER is the new assayer for the Chloride M. Co. at Dedrick, Trinity Co., Cal.

ELMER HILL, Mgr. Fortune M. & M., Bingham, Utah, has returned from a trip to New York.

J. M. WOLFE, Mgr. Republic M. Co., Republic, Wash., who has been East, has returned to the mines.

W. C. MORRISON, who has been in San Francisco on mining business, has returned to Placerville, Cal.

JAMES BREEN is to be succeeded in the superintendency of the Northport, Wash., smelter by A. W. Hudson.

H. W. HOYT, Sec'y Gates Iron Works, Chicago, visited the company's Salt Lake, Utah, agency on the 8th inst.

W. C. TURNER is Supt. Hazel Dell mine, Carters, Cal., succeeding A. Campbell, who has gone to Mexico.

E. H. WEBSTER is assayer for the Colorada-Creston M. Co., Minas Prietas, Mex., vice G. N. Powell, resigned.

W. C. RALSTON, Pres. California State Miners' Association, has returned to San Francisco from Calaveras Co., Cal.

WM. MOOREHEAD, former foreman Sierra Nevada mine, is Supt. Dreisman mine, Arrastraville, Tuolumne Co., Cal.

B. JONES, formerly at the Golden Gate mine, Mercur, has been appointed Supt. West Morning Glory mine, Tintic, Utah.

EDW. FOLTZ, formerly of Aspen, Colo., and lately with the Gladiator mine, A. T., is foreman American Flag mine, Prescott, A. T.

J. S. MACARTHUR, one of the original patentees of the MacArthur-Forrest cyanide process, is visiting the west coast of Tasmania.

HENRY LITTLE AND GEORGE DEATON of Colorado Springs, and J. C. Spicer of Criple Creek, have been in New Mexico examining mines.

C. O. BAKER JR. of Newark, N. J., has returned home after a three months' absence on the Pacific coast and Hawaiian islands.

D. TOOKER, who is operating with J. H. Devereux in the Chloride country, Mojave Co., Ariz., has returned to Kingman from a visit to Los Angeles.

GEO. O. BRADLEY of Salt Lake City, Utah, is preparing to open a mining and milling supply house in Spokane, Wash., having already secured quarters there for his business.

G. A. ROBERTSON, of Mammoth, Utah, leaves for Butte, Mont., Sunday, from where he will go to California to take charge of a mine and mill for George H. Robinson.

D. M. BURNS AND THOMAS H. WILLIAMS have returned to San Francisco from a visit to the Union mine, El Dorado Co., Cal., the present output of which is reported to be about $1000 per day.

T. R. BARD, California's new Senator, made most of his money in California oil. Nearly all the rich United States Senators have made their money in mining—Clark, Stewart, Hanna, McConnell, Jones, Elkins, etc.

Commercial Paragraphs.

JOHN WIGMORE & SONS CO., Los Angeles, Cal., have sent a carload of mining machinery to the Commonwealth mine, Pearce, Ariz.

THE Gates Iron Works, through Geo. O. Bradley, secured the contract to erect the new Republic mill, Republic, Wash., of which Daniel C. C. Jackling is Supt.

THE Union Steam Pump Co., of Battle Creek, Mich., have lately placed several of their make of pumps with the Tamarack, the Hecla, and the Calumet copper mining companies of northern Michigan.

THE J. H. Montgomery Machinery Co., 1220 Curtis street, Denver, Colo., have sold a 5-stamp mill to the Mount Pisgah M. & M. Co., Florissant, Colo., and a 50-ton crushing and concentrating plant to G. W. Ingersoll, Woodland Park, Colo.

THE Mine & Smelter Supply Co. recently shipped from its Salt Lake City branch the hoisting and pumping machinery and other equipment for the Oregon & Pennsylvania mine, near Sumpter, Or.; also, a similar shipment to Republic, Wash., to equip the Chico group in the latter camp.

THE Metropolitan Electric Supply Co. of London, England, one of the largest electrical concerns in the British Empire, has placed an order for four 90-gallon Cross oil filters, manufactured by the Burt Mfg. Co., of Akron, O., for use in their stations. The British Government has been a large buyer of these goods during the past year, notwithstanding the fact that the English makes are both plentiful and cheap.

THE Colorado Iron Works Co. of Denver, Colo., have sent a complete copper smelting furnace to the Whipsaw Copper Co., Whipsaw, Ariz., two 150-ton chlorination barrels to the Republic Reduction Works, Republic, Wash., and have orders for ten Bartlett concentrating tables, three sets 6x30-inch sectional high-speed crushing rolls, calcining furnace for the Compania Mexicana, Old Mexico, four self-dumping slag trucks for the Arizona Copper Co., Clifton, Ariz., and castings for five Buckner roasting furnaces for Utah.

THE Pike's Peak Power Co., a corporation controlled by the Woods Investment Co. of Victor, Colo., has just closed a contract of considerable magnitude and importance to those interested in the development of hydraulic power and electric transmission. They propose to transmit power from Beaver creek, located about ten miles from Victor, for the purpose of running the mill, hoist and reduction works of the Gold Coin Mining & Leasing Co., one of the richest mines in Cripple Creek. The hydraulic conditions are particularly favorable, as they embrace a total head of 2300 feet, obtainable in about 6000 feet of pipe, and a water supply sufficient to produce 5000 H. P. The intention is to divide the power plant into two separate units, the first unit being situated at a point affording a head of 1150 feet. The water, after passing through the first set of wheels, will be led into another pipe and thence down to the next station, 1150 feet below. Thus the water does double service, and the arrangement divides the liability of accident between the two plants—insuring absolutely continuous service at all times. The first plant, which is now under construction, is supplied by a sheet steel riveted pipe line 3200 feet long, 29 inches diameter, and varying in thickness from $\frac{3}{16}$ to $\frac{5}{8}$ of an inch. The power units consist of four 375 K. W. General Electric generators, running at 450 revolutions per minute. Each generator will be direct connected to a pair of Pelton water wheels, 69 inches diameter and of a combined capacity of 675 H. P., each wheel being supplied with deflecting nozzle. The wheels and generators will be mounted on separate base plates, and shafts will be connected by means of combination flywheel couplings. The plant when completed will represent the highest development in hydraulic-electric work and will be a model in every particular. The complete hydraulic system, including pipe line and water wheels, is furnished by the Pelton Water Wheel Co. of San Francisco, the electrical apparatus being supplied by the General Electric Co. The Woods Investment Co. control large holdings in the Cripple Creek district, and it is the ultimate object to establish a general transmission plant to supply the mines and railways in the vicinity.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING FEB. 6, 1900.

643,037.—CUT GRAIN CARRIER—Henry Bryan, Modesto, Cal.
643,040.—SCREW HOLDER — Carvin & Bourland, Valley Springs, Cal.
643,096.—SAVING GOLD, ETC. — S. B. Christy, Berkeley, Cal.
642,785.—ROTARY ENGINE — J. Craig, Highland Springs, Cal.
642,681.—CAN HEADING MACHINE—W. F. Davis, S. F.
642,968.—LIQUID RAISER—R. W. Elliott, Oakley, Cal.
642,791.—ANIMAL EXTERMINATOR—J. T. Gray, Hollister, Cal.
642,747.—DUST PREVENTER—J. Kullman, Benicia, Cal.
642,616.—COOKER—C. O. Lee, So. Tacoma, Wash.
642,798.—TEACUPS — A. E. Macdonald, S. F.
642,706.—GAS ENGINE—A. L. Navone, Calistoga, Cal.
642,853.—HYDRAULIC GIANT—J. P. Simmons, S. F.
642,638.—BASKET BAT—A. B. Smith, Los Angeles, Cal.
642,639.—PLAYING BALL—A. B. Smith, Los Angeles, Cal.
673,013.—REFRIGERATER—J. C. Stuart, Puyallup, Wash.
642,936.—POWER TRANSMITTER—F. C. Thompson, Burton, Wash.
643,016.—BICYCLE RACK — W. Thum, Pasadena, Cal.
643,075.—WATER VALVE — J. W. Van Brocklin, Seattle, Wash.
643,076.—WATER VALVE — J. W. Van Brocklin, Seattle, Wash.
642,735.—DRAFT EQUALIZER—F. G. Vestal, Pleasant Grove, Cal.
32,194.—DESIGN—C. A. Conger, Oakland, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

GAS ENGINE.—A. L. Navone, Calistoga, Cal. No. 642,706. Dated Feb. 6, 1900. This invention relates to improvements in what are known as gas or explosive engines. It consists of a cylinder closed at both ends with a piston, piston rod and connections by which the reciprocation of the piston is communicated to the mechanism to be driven. In conjunction with this piston moving from end to end of the cylinder are ports so arranged that there is a centrally located exhaust port and gas supply passages at each end of the cylinder, with inwardly opening spring-closed poppet valves and pipes connecting said openings and valves with a centrally disposed slide valve. A carburetor or gas supply is connected with the slide valve chamber, and means for reciprocating the valve so as to alternately admit the explosive gas to opposite ends of the cylinder at the instant when the piston has passed the exhaust port to allow the waste products of the former explosion to escape. This practically makes the engine double acting with a single cylinder. In conjunction with this is an air-forcing mechanism by which the explosive vapor and air are forced through the valve ports and connecting passages when opened so as to charge the cylinder by direct pressure at the instant of the closing of the exhaust passage.

AUTOMATIC CAN HEADING MACHINE.—W. F. Davis, San Francisco, Cal., assignor of one-half to J. Lee, Jr., same place. No. 642,681. Dated Feb. 6, 1900. The object of this invention is to place the heads upon the ends of sheet metal cans and assemble the incomplete parts preliminary to the final fitting of the heads upon the bodies, this being done without any special sizing of the bodies or fitting the heads thereto. It also comprises a means for applying and retaining the heads in contact with the main bodies until by the advance of the heading apparatus the bodies of the cans thus held are delivered into a supplemental crimping apparatus by which the heads are subsequently crimped and fixed upon the can bodies. The machine which embodies this invention comprises a series of journal disks, spiders or other carriers, each having a set of fixed segmental jaws, and so journaled with relation to each other and so driven by operating mechanism that pairs of segments upon the respective spiders will always be brought together so as to partially enclose a can body while the can heads are brought into contact and forced upon the ends of the can bodies. After this has been effected, the bodies having the heads in place are guided and delivered into a crimping machine which finishes the operation.

DRAFT EQUALIZER.—F. J. Vestal, Pleasant Grove, Cal. No. 642,735. Dated Feb. 6, 1900. This invention relates to a means for equalizing the draft and the application of power of large teams when applied for hauling harvesters, plows or other heavy machinery. In driving large teams composed of many draft animals, it is very difficult to equalize the power so that all the animals will have an equal amount of work, and this invention is designed to produce such equalization. It consists of draft bars to which the different series composing the team are so connected that the pull between part of the team counteracts the pull of the other. The equalizer bars are connected by chains which pass over pulleys so that the forward bar is connected with the second bar by, for instance, a single chain passing over a pulley, and a chain connects this pulley with another compound pulley device which connects with the third bar and with the implement or machine to be hauled and so on, each added team necessitating an additional pulley device.

TEA MAKING ATTACHMENT FOR CUPS.—A. E. Macdonald, San Francisco, Cal. No. 642,798. Dated Feb. 6, 1900. This invention relates to a device which is designed for use with tea cups and for the purpose of making a single cup of tea. It comprises a cover having a central opening and an annular flange rising from its outer surface and surrounding said opening. A screen basket is fixed in the opening, and a cup having a flange is adapted to fit the flange of the cover. This cover being set upon the cup, the tea within the basket will be immersed in the hot water in the cup and the tea can be drawn of any desired strength. By removing the cover and reversing it the tea leaves will fall from the basket into the cup and remain there and may be used again for another cup.

DUST PREVENTER FOR ROTARY PULVERIZERS.—J. Kullman, Benicia, Cal. No. 642,747. Dated Feb. 6, 1900. This invention relates to an attachment for preventing the escape of dust from apparatus which is designed for crushing and pulverizing bark, bones, brick, or other like material. It consists of a cap applied upon the outside of the pulverizer case and having no external openings. Holes are made through the case opening into this cap, the cap being fixed upon the case just above the feed hopper. The action of the cap appears to be to check the currents of air which are produced by the revolving beaters within the case, and to prevent such action as will throw the dust out of the hopper opening of the case.

COMPOUND FOR EXTERMINATING BORING ANIMALS.—J. T. Gray, Hollister, Cal. No. 642,791. Dated Feb. 6, 1900. Burrowing animals, such as gophers, ground squirrels, etc., are a great pest to agriculture generally, and it is very desirable to discover some means by which they can be readily exterminated. This is effected by the present invention which consists of a compound of ingredients which will produce a suffocating vapor and this is applied to a suitable carrier which can be introduced into the burrow of the animal and ignited so as to form the suffocating fumes which will destroy the animal.

Recently Declared Mining Dividends.

Rambler-Cariboo Mines, Ltd, $10,000; payable Mar. 1.

Silver King, Utah, 50 cents per share, $75,000; Feb. 10.

Montana Ore Purchasing Co., $1 per share, $80,000; Feb. 15.

Deer Trail Con. M. Co., Stevens Co., Wash., first dividend of ¼ cent a share, $7500, on 3,000,000 shares; Feb. 10.

Homestake M. Co., South Dakota, regular monthly dividend 25 cents per share, and extra one same amount, aggregating $105,000; payable Feb. 25.

Books Received.

"U. S. Geological Survey and Atlas," 19th report, Part V, Forest Reserves. Copies on application to U. S. Geological Survey or through U. S. Senators and Representatives.

"A Manual of Practical Assaying," H. Van F. Furman, quarto, pp. 463, the latest, fifth edition of an unusually complete work. Considerable of the matter was originally published in technical journals, and the present state of the art justifies the addition of new matter and a re-editing of much that was in the earlier editions. Jno. Wiley & Sons, N. Y.; $3.

Latest Market Reports.

SAN FRANCISCO, Feb. 15, 1900.

SILVER—Per oz., Troy: London, 27⅜d (standard ounce, 925 fine); New York, bar silver, 59⅞ cts. (1000 fine); San Francisco, 59⅞: Mexican dollars, 47¾c.

COPPER.—New York: Lake, 1 to 3 casks, 16.75 cash; carload lots, 16¼; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.00; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17½@18. Mill copper plates, 23¾c; bars, 25½@27c.

LEAD.—New York, $4.70; St. Louis, $4.70; San Francisco, $5.00; pipe 7½, sheet 8¾, bar 6½c. London, Soft Spanish Lead, £16 10s=4.71c per lb.

SPELTER. — New York, $4.70; St. Louis, $4.70; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 10c; 300 to 500 lbs., 11@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

IRON. — Pittsburg, American soft, $25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c.

STEEL.—San Francisco, bar, 12c to 20c per lb.

QUICKSILVER.—There has been no change for several weeks. New York, $51.75; London, £9 14s; San Francisco, local, $51.50 ℔ flask of 76½ lbs.; export, $47.50.

PLATINUM.—San Francisco, crude, $16 ℔ oz.; manufactured, $19@22.

FERRO-MANGANESE. — San Francisco, ℔ ton, $30.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

TIN.—New York, pig, $28.50; San Francisco, $31.50; bar tin, ℔ lb, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 40c to 50c.

NICKEL.—New York, 40@45c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.80 50-lb lots; San Francisco, $2.50 to $3 lb lots.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ℔ set; 14 oz., 40s., 11c.

FERRO-TUNGSTEN.—New York, 60c; San Francisco, 75c (60%).

MAGNESIUM.—New York, $3.50 ℔ lb.; San Francisco, $4.50.

TUNGSTEN.—New York, ℔ lb., 75c; San Francisco, 90c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 34@36c ℔ lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, 1¾c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs' $10.05; Colorado Anthracite, $14.50.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, **Money** loaned mines, **Mining** companies organized, their property exported, financed and managed, **Mines**, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, **Examine** mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and Chemical work done. EDW. N. BREITUNG, Marquette, Mich., U.S.A. CABLE ADDRESS, EDBEE. CODES LIEBER'S, BEDFORD MCNEIL'S, A B C UNIVERSAL COMMERCIAL.

Experienced Mining Engineer (age 40) reports on mines and their economical development; ore dressing; processes; mining machinery and mill construction. References. P. O. Box 971, Denver, Colorado.

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 15, 1900.

9:30 A. M. SESSION.

100	Caledonia...36c	400	.....55c
150	.....37c	500	Potosi.....27c
100	C. C. & V.$1 30	400	Sierra Nev'a.42c
200	G. & C.....14c	400	.....41c
50	H. & N.....31c	1100	.....40c
200	Mexican.....23c	700	Union.....25c
100	Ophir 56c	100	Utah.....08c

2:30 P. M. SESSION.

100	Ophir.....53c	100	Crown P't...09c
10	.....50c	100	.....10c
100	Mexican.....23c	1000	Y Jacket...17c
500	.....22c	100	Belcher.....22c
50	G. & C.....15c	500	Sierra Nev..40c
100	C. C. & V.$1 35	400	Utah.....07c
200	Savage.....12c	700	Union Con...25c
200	Chollar 22c	200	Andes.....05c

WANTED.

WANTED.—A Second-Hand White Howell Roaster, also a Revolving Drier.

Must be in good repair. Address ARTHUR HENDEY, Agent, Copper Chief Mining Company, Jerome, Arizona.

Wanted.—Foreman for Twenty-Stamp Mill.

One hundred and fifty dollars per month and board. Address THE WM. HAMILTON MFG. CO., 316 S. Euclid Ave., Oak Park, Illinois.

WANTED.—A STAMP MILL MILLWRIGHT.

Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

WANTED.

PARTY TO DEVELOP A COPPER PROSPECT,

ONLY FIVE MILES FROM RAILROAD.

138-foot shaft. Several tons of ore on the dump. High-grade rock. Address G. F. CLARK, Tempe, A. T., care of I. S. Watrous.

SITUATIONS WANTED.

WANTED.—By a Practical Miner and MINING BUSINESS Man, Position as Manager or Superintendent. Speak some Spanish. Would leave the United States if necessary. Good references. Address SUPERINTENDENT, this office.

Mining Engineer and Metallurgist, technically educated, with fifteen years of practical experience, is open for a new engagement as expert or superintendent, Specialty the treatment of rebellious silver and gold ores. Experienced in designing, building and running reduction works. Speaks and writes Spanish fluently. Address ALPHONSE BENO, P. O. Box 814, City of Mexico.

STOCKHOLDERS' MEETING.

Notice of Stockholders' Meeting of the Union Hill Consolidated Mines.

In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated Mines, a meeting of the Stockholders of this Company will be held at 11 o'clock in the forenoon on Tuesday, the 27th day of February, 1900, at its principal office, 320 Sansome St., room 24, San Francisco, California, to consider and vote upon the proposition to increase the Capital Stock of this Company to four hundred thousand ($400,000) dollars in 400,000 shares at the par value of One Dollar each.

JOSEPH H. MOOSER, Secretary.

Dated San Francisco, January 15th, 1900.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from A. B. Jacks, in the Badger Hill Mine, near Spanish Ranch, Plumas Co., to deposit tailings in Whitlock Ravine; from Manuel Leal, in the Union Mine, in New York Township, Yuba Co., to deposit tailings on New York Flat; from Walter E. Peterson, in the Manila Placer Mine, near Igo, Shasta Co., to deposit tailings in a worked-out pit; and from the Cherokee Gravel and Gold Mining Company, in the Cherokee Gravel Mine, near Carter's, Tuolumne Co., to deposit tailings in Bear Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on March 5, 1900, at 1:30 P. M.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

M. S. HAUSER,

Room 39, 3 California St., San Francisco, Cal.

Will act as purchasing agent for mining companies.
Will use the benefit of his wide experience in getting the best articles at the lowest prices, securing low freight rates, and prompt delivery.
Will submit estimates on all kinds of supplies.
Will work for either a small salary or a commission, and show a saving greatly in excess of charges.

Wealth Producers.

Copper mining has been more profitable than any other business undertaking.

STATISTICS SHOW THE GREAT RESULTS. WRITE FOR PAMPHLET.

COLONIAL COPPER COMPANY,
32 Broadway, N. Y.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Fase Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

UTAH and CALIFORNIA

Are two of the most magnetic names in the roll of States, and the best way to reach them is over the Rio Grande Western Railway. "Great Salt Lake Route" As the name intimates, the Rio Grande Western is the only line that passes directly through Salt Lake City on the way to California; and Salt Lake City and the Great Salt Lake are the two points which should certainly not be missed on your western trip, as they contain more interest to the average American than any two other points within the confines of the United States. Study the matter carefully and you will choose the Rio Grande Western for this reason as well as for the magnificent scenery, superb equipment and fast time. It is the popular route during the winter as in summer. Write to GEO. W. HEINTZ, General Passenger Agent, Salt Lake City, for particulars.

FOR SALE.

10 H. P. Gasoline Hoist for Sale.

Complete outfit in good condition. Price low. Address PAUL J. PITNER, Placerville, Cal.

FOR SALE.—DIVIDEND-PAYING, HYDRAULIC placer. Extensive deposits. Old channel gravel, water, pressure, grade, dump, and gold. Rigid investigation invited. Thoroughly legitimate. Banking references. Owner. IDAHO, care of Mining and Scientific Press.

Mines for Sale.

A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.
H. E. RUNKLE, Mining Broker, El Paso, Texas

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.
For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

A BARGAIN.

3500 feet of 16-inch, 5 B. W. G National Tube Works seamless pipe. Kimberly joints. Immediate delivery.

Address PIPI, Room No. 140, No. 32 Broadway, New York City.

STEEL RAILS FOR SALE.

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One 30-Ton Saddle Tank Standard Gauge Locomotive, f. o. b San Diego, Redondo, or San Pedro, Cal. Correspondence solicited.
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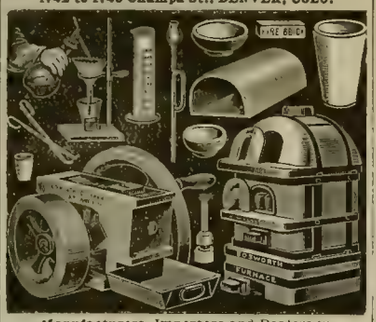
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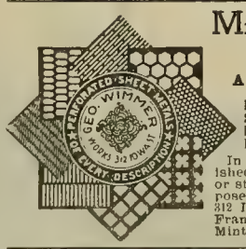
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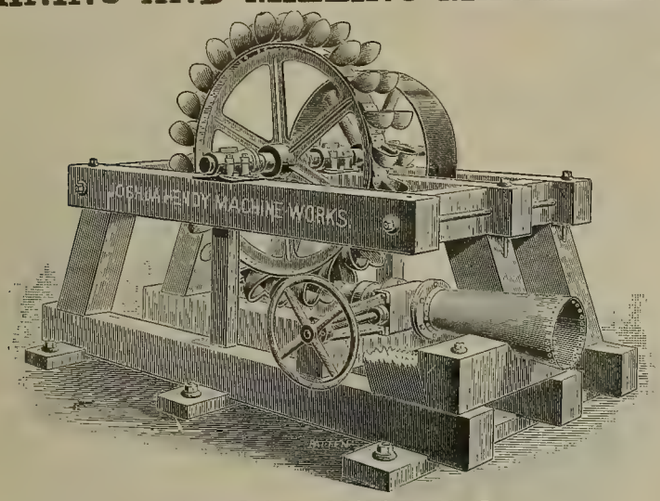
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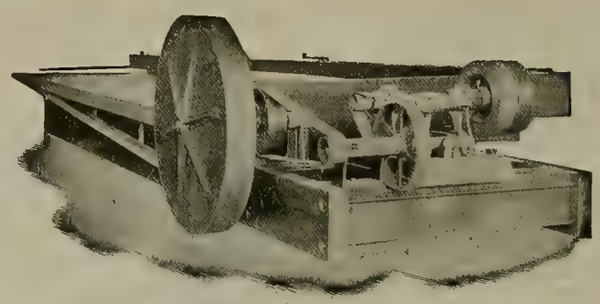
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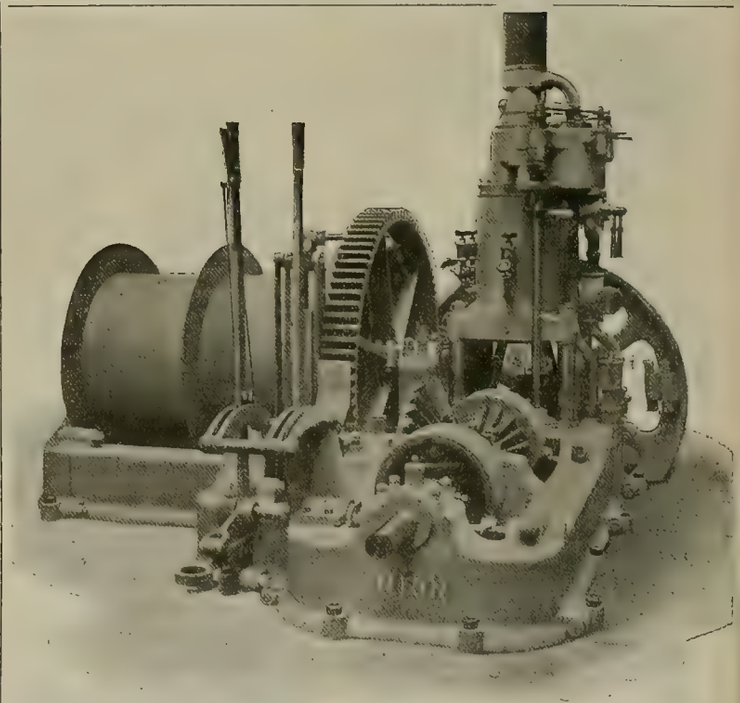
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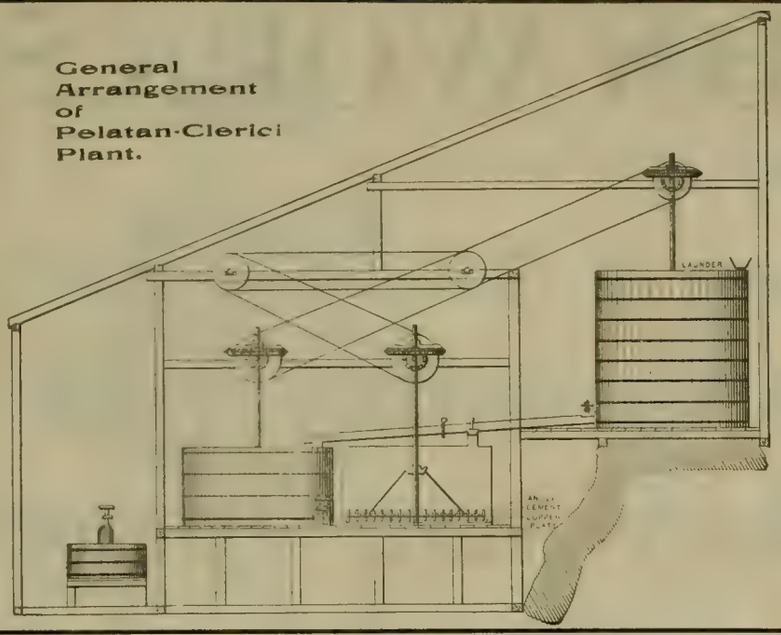
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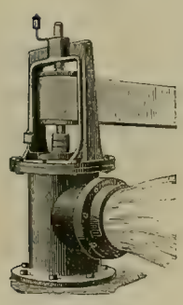
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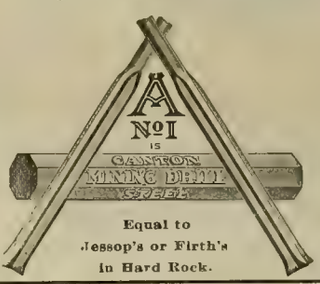
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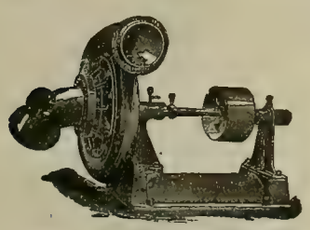
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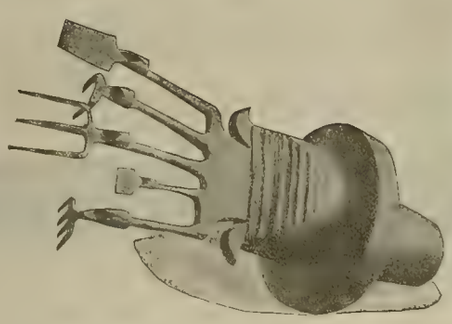
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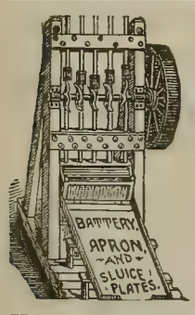
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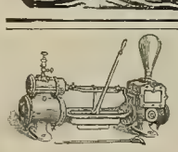
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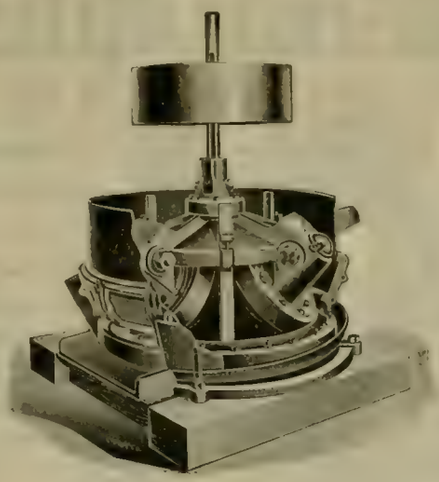
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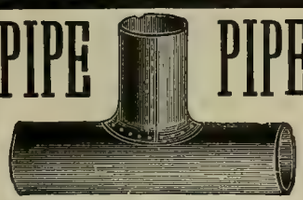
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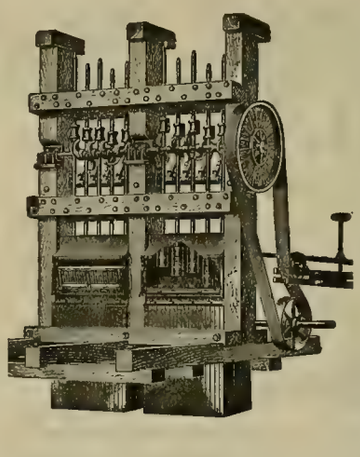
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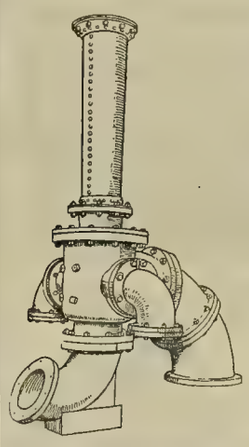
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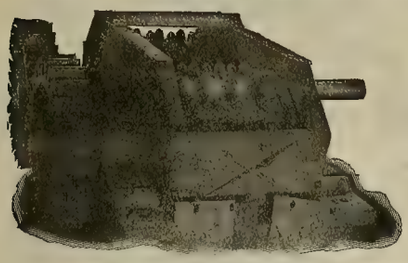
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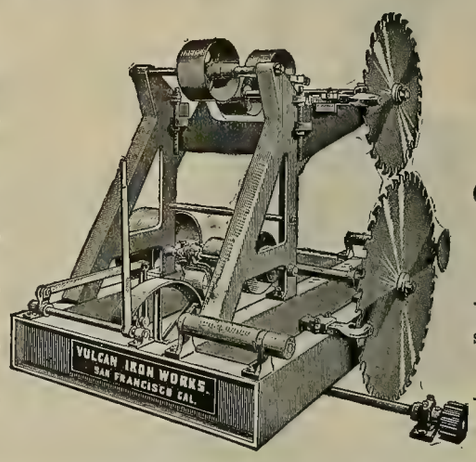
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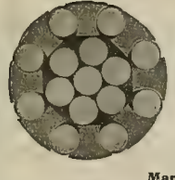
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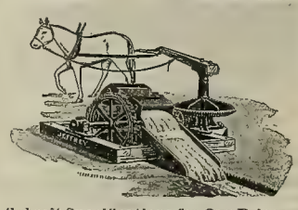
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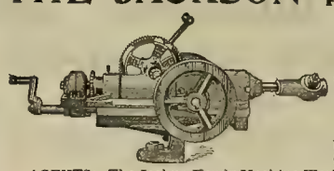
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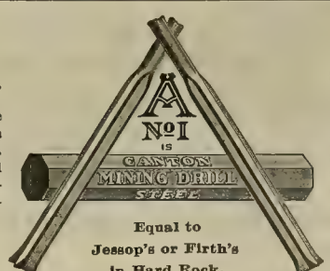
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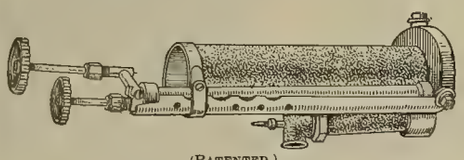
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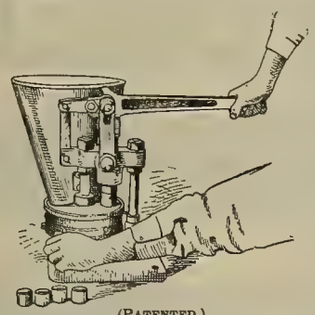
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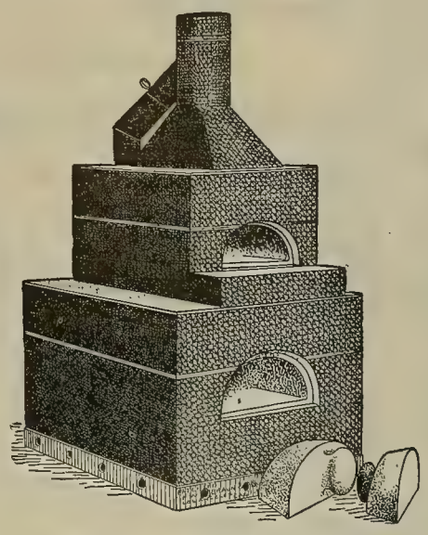
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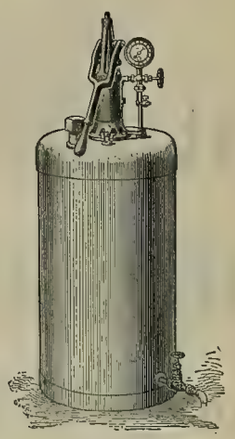
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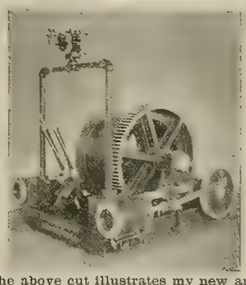
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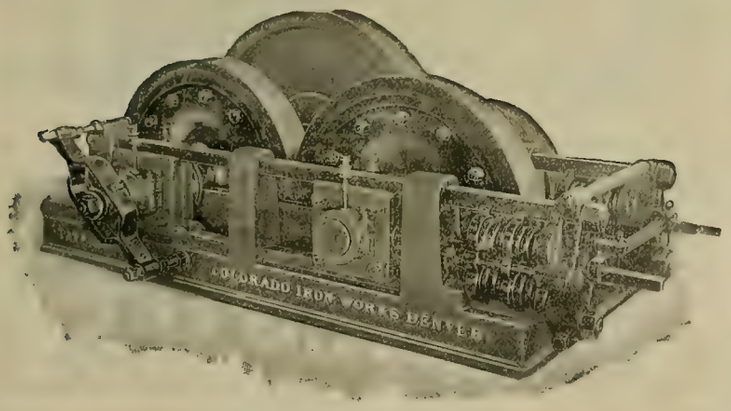
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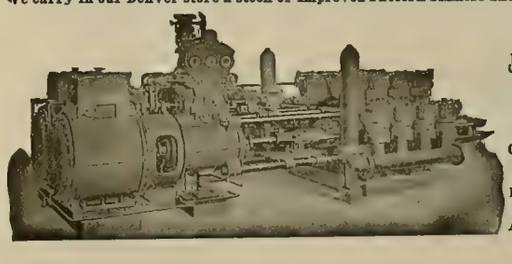
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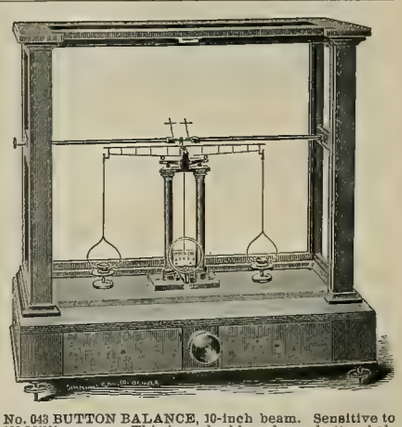

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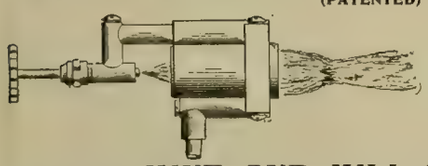
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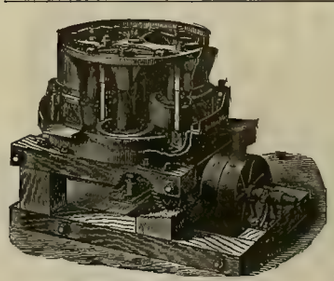
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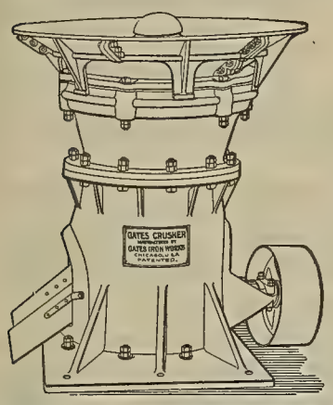
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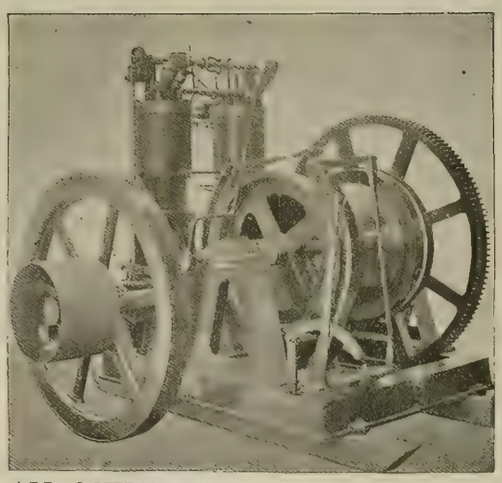
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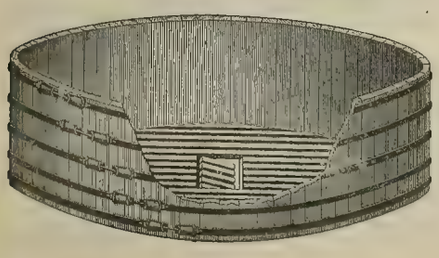
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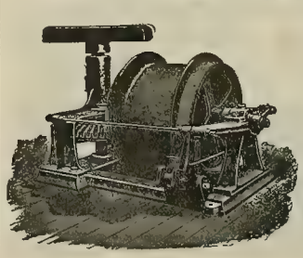
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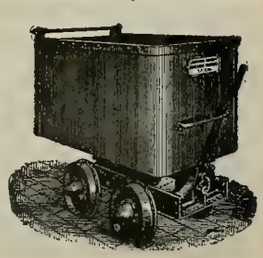
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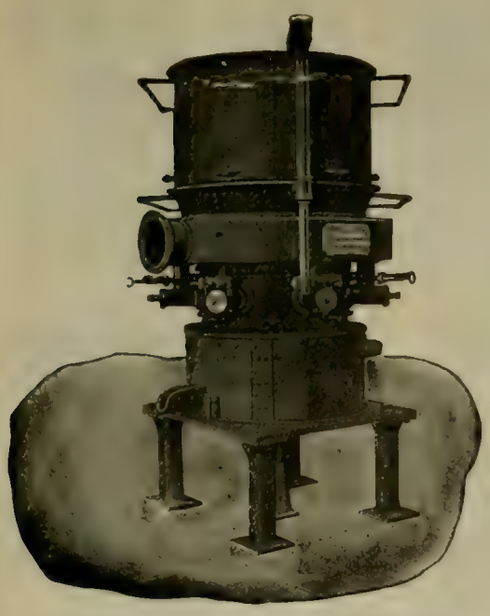


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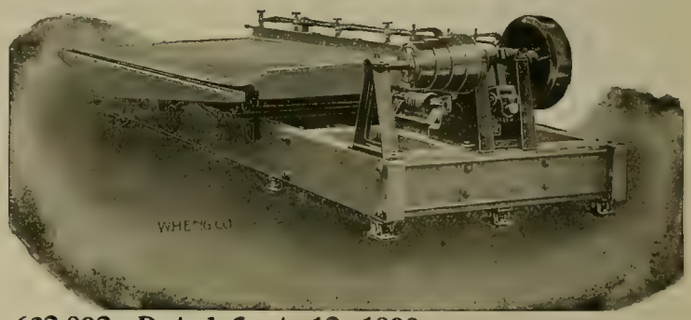
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Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of January, 1900, an assessment (No. 22) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of February, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 19th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

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Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1900, an assessment (No. 2) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of March, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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J. W. PEW, Secretary.

Office—No. 310 Pine street, room 36, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 15) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of March, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 118) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on Tuesday, the 13th day of March, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of April, 1900, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 14) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 9, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of March, 1900, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 9th day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary

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DELINQUENT SALE NOTICE.

QUINCY MINING AND WATER COMPANY.—Location of principal place of business, San Francisco, California; location of works, Spanish Ranch, Plumas County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 2nd day of January, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No Cert.	No. Shares.	Amt.
Alfred Burns	50	100	$40 00
Mrs. F. G. Brown	73	300	120 00
Frances Camille Berthiaume	109	1,850	740 00
Frances Camil e Berthiaume	110	2,000	800 00
Mrs E. J. Cadwallader	15	800	320 00
P. Crowley	101	250	100 00
R. R. Grayson	65	1,000	400 00
Alice B. Munroe	20	100	40 00
James W. Orndorff	22	50	20 00
Warren Olney	82	100	40 00
Thomas Quigley, Trustee	103	1,000	400 00
W. C. Ralston	89	1,000	400 00
W. C. Ralston, Trustee	52	1,000	400 00
W. C. Ralston, Trustee	53	1,000	400 00
James Simpson	102	750	300 00
John Young	12	200	80 00
		11,500	$4,600 00

And in accordance with law, and an order from the Board of Directors, made on the 2nd day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, No. 439 California street, San Francisco, California, on MONDAY, the 5th day of March, 1900, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

THOMAS QUIGLEY, Secretary.

Office—No. 439 California street, San Francisco, California.

DELINQUENT SALE NOTICE.

MAY DAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 29th day of November, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Fanny Mayblum	61	50	$5 00
J. P. E. Heintz	57	1,000	100 00
J. P. E. Heintz	116	125	12 50
J. P. E. Heintz	129	4,000	400 00
J. P. E. Heintz	134	500	50 00
J. P. E. Heintz	135	200	20 00
Wm. A. Junker	71	500	50 00
Annie D. Weeks	133	500	50 00
C. G. von Treutler	127	400	40 00

And in accordance with law, and an order from the Board of Directors, made on the 29th day of November, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, Heald's Business College, 24 Post street, San Francisco, California, on TUESDAY, the 20th day of February, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 10) levied on the 4th day of January, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

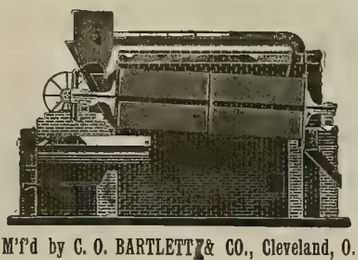
Name.	No. Cert.	No. Shares.	Amt.
F. F. Anthes	185	250	12 50
E. Hartmann	138	100	5 00
E Hartmann	201	650	32 50
H. H. Hartmann	143	75	3 75
H. H. Hartmann	150	25	1 25
H. H. Hartmann	202	400	20 00
A. Schwartz	152	250	12 50
B. Strueven	184	500	25 00

And in accordance with law, and an order from the Board of Directors, made on the 4th day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 773 Mission street, San Francisco, California, on MONDAY, the 5th day of March 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

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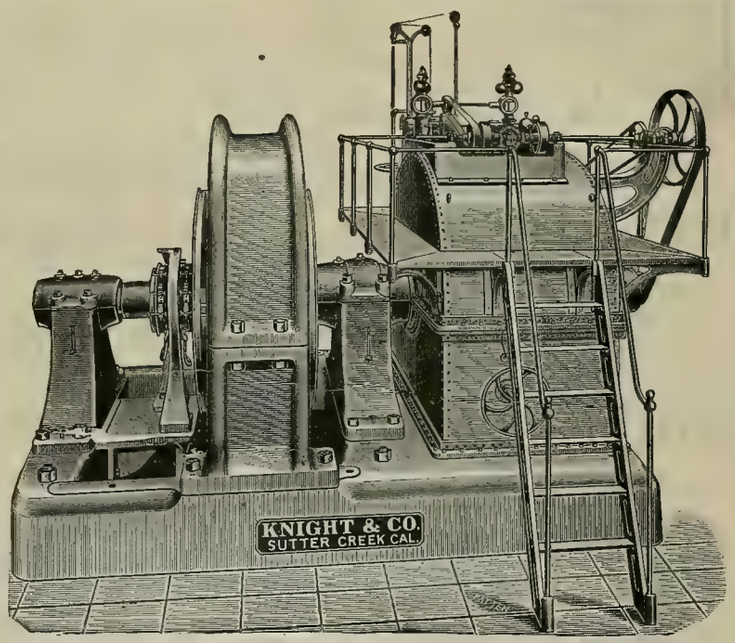
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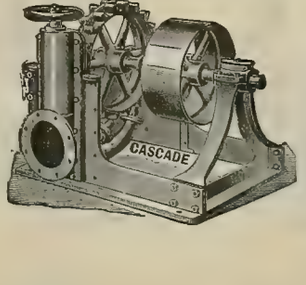
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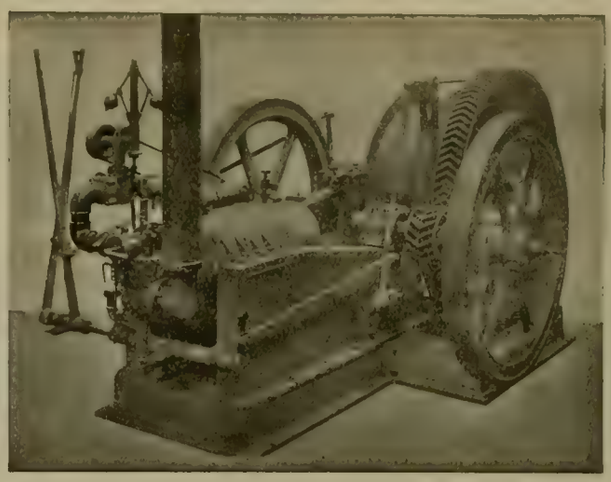
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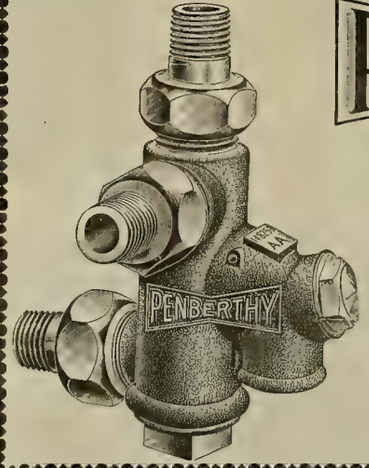
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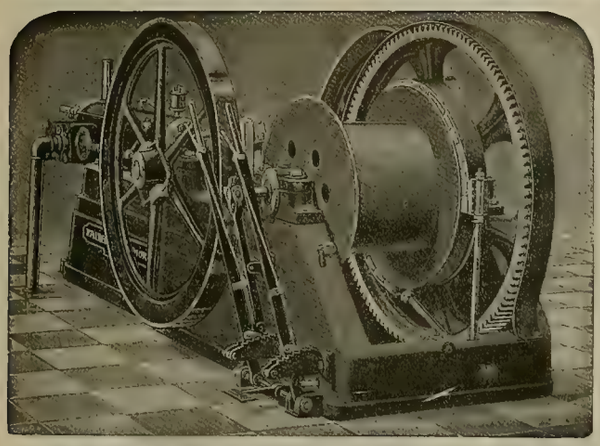
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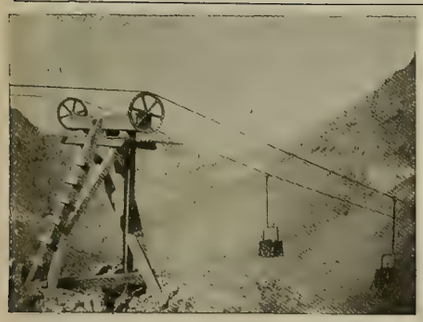
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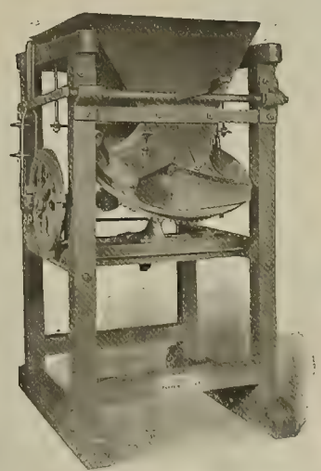
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Shipping weight, with wood frame, - 800 pounds.
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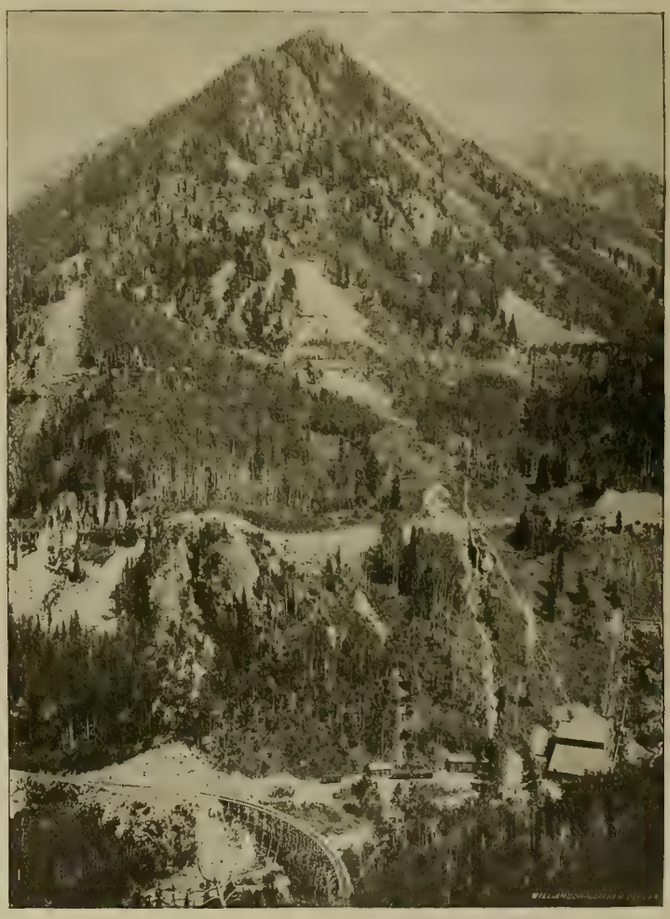
The Butterfly, Colo., Mine and Mill.

In last week's issue on this page appeared two illustrations from photographs, taken expressly for the purpose, of one of California's high gold mines, the May Lundy mine and mill, Mono county, about 11,000 feet above the sea. In Colorado are many mills at even higher altitudes. One of these, in San Miguel county, is represented herewith, through the courtesy of the Journal of Telluride, Colo. Colorado enjoys unusual railroad facilities, and its several transportation companies have done much for that State's mining industry. These roads traverse territory at an altitude of 10,000 or 11,000 feet, and make profitable the working of many mining properties whose position would ordinarily preclude possibility of profit. Such a property is the Butterfly mine and mill, in Ophir district, where the railroad, circling to the summit of the Rockies, creates a community that, like others of its class, produces a permanent addition to the world's wealth in the shape of monthly gold yield.

The Butterfly property is to be transferred on the 15th prox. for $200,000. The mill shown in the accompanying illustration is of small proportions—thirty stamps, 800 pounds each—with a daily capacity of 120 tons, run by water power, but clearing $150 per day on $10 ore. The new owners will, of course, increase the mill's capacity, as there is abundant ore. A spur from the Rio Grande Southern runs to the mill; concentrates and mill product are loaded direct from the mill to the cars, affording opportunity for that economy in handling that goes so far toward making profitable a mining property. The difference between California and Colorado milling methods is accentuated by the slow-drop performance of the stamps in the Butterfly mill, that system being deemed more desirable in the amalgamation of the ore containing so large a percentage of pyrites, as in this case; in sharp contrast to the heavy stamp, rapid-drop system in vogue in California.

Mining at Cape Nome, Alaska.

The present interest manifested in Cape Nome, Alaska, justifies continued reference thereto. In previous issues have appeared abundant information concerning that region, and illustrated articles showing how beach mining is carried on there. Herewith is portrayed a familiar scene—men mining the beach sands there with a rocker, a primitive and often a wasteful way of securing the gold there. The necessity for some other device has occasioned the production of several styles of apparatus, designed to secure economical saving of a higher percentage of the gold, some of which will have opportunity next season of proving their practical value. One of these devices is the Drake amalgamator, made and supplied by the Krogh Manufacturing Co. of San Francisco. An illustration of the machine is presented. It will be noted that there are six sections of riffles, eight riffles to each section, framed to permit of easy removal. Quicksilver may be used, but the manufacturers claim that "with the proper means of segregation a large percentage of the values can be saved without the use of quicksilver." The shape and arrangement of the riffles provide a uniform width of discharge of about 36 inches. Its capacity is stated to admit of handling over 100 tons of material in twenty-four hours with less than three miners' inches of water, the amalgamator being considered adapted to the saving of flour gold, as well as any form of gold that will settle or amalgamate. The machine is made for hand or motor power and has been in practical operation.

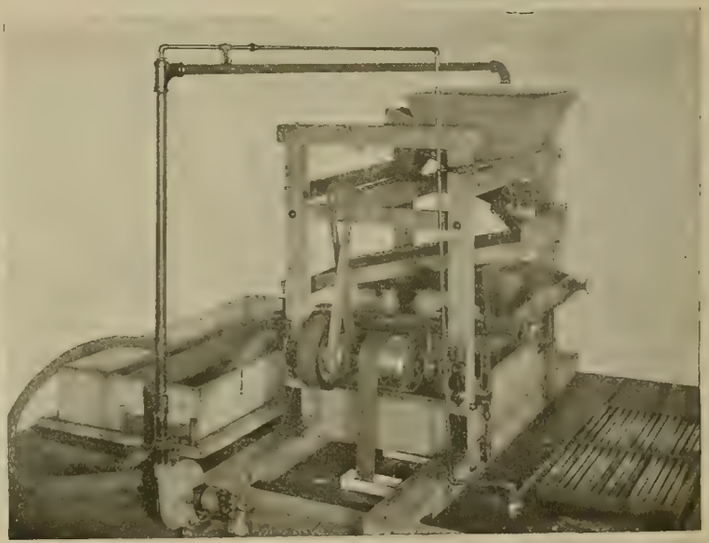


The Butterfly Mill, San Miguel Co., Colo.

Straight up half way to the top of the mountain in an open spot is dimly seen the openings to three levels of the mine. In the center foreground is shown the Rio Grande Southern bridge across Lake Fork, 100 feet above the creek bed Half way between the mill and mine the same railroad is seen climbing up and around the mountain.



Mining on the Cape Nome Beach With Rocker.



Drake Amalgamator, Designed for Beach Sands.

MINING AND SCIENTIFIC PRESS.

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"Grubstaking."

In a country like the United States, wherein are large areas of mineral lands, much of it unprospected and a very small fraction of it developed; wherein the people are generally prosperous and a large number of them wealthy; wherein mining has been the beginning or the whole of many fortunes, and where those fortunes are still largely employed in the business, constituting a safe precedent; wherein method and appliance advance first, and the technical side of the industry is represented by most competent men—it would seem, in such a country, that the homely termed business of "grubstaking" should be profitable employment for incomes beyond reasonable requirements. There are men to be picked out from many, and yet they are not few, who possess the qualifications necessary to successful prospecting. Hardy, energetic, intelligent and honest should be the label on a man before he is entrusted with the funds of his backers. In addition, he should possess some knowledge of mineralogy, geology and lithology; but, more important than these, is experience. Assuming that this kind of a man is to be had, suppose him to be furnished with a monthly allowance—say, $100—sufficient to support and transport him, pay for assays, etc., and assume that he will keep constantly at work for three years. This would be an investment of $3600—a less amount than is usually asked for the commonest kind of a prospect. It is almost certain that within the three years the man would find ten prospects worth $3600 and one worth $36,000. Of course, he would have to be considered and taken care of and he should be. Why isn't "grubstaking" a good investment?

Favorable Smelter Locations.

Among the projects earliest agitated in new mining districts is the establishment of a smelter. The inactivity of old districts is frequently attributed to the lack of a reduction plant. In the first instance, usually, development is insufficient to warrant the erection of a smelter for a long time after the enterprise is first suggested. In the second case, a dearth of smelting ore is the common explanation of the absence of smelters.

Naturally, the first essential to the successful operation of a smelter, or any other treatment plant for ores, is ore supply. Given this, the problem is, commercially, one of economics. Geographical location is an important factor, since in so many cases dependency on outside fuel supply is necessary, which implies dependency on lines of transportation. A smelting plant on a single railroad line is always at the mercy of that railroad, and always liable to unjust discrimination to the extent of being forced out of business.

The natural locations for smelters are centers to which subsistence is available in all directions. A smelter differently located is analogous and subject to the same conditions under which the treatment plant of an individual mine is operated. When the mine stops work the smelter stops work.

The growth of a small plant established to treat the ores of one section is necessarily proportional to the growth and yield of that section, and, unless so situated as to draw material from other sources, will go out of business if the few mines upon which it is dependent cease producing. Proper location, abundance of ore, requisite fluxes, satisfactory transportation arrangements, are among the prime necessaries of practise. With these it is also necessary to have abundance of working capital, and to transact business in a way to invite and retain public confidence and assure prestige and favorable reputation.

With all these it is necessary to have intelligent management. The possession of the requirements enumerated would fall short of success unless were included a manager fully competent. Such men are exceedingly scarce, and are rarely unemployed.

General Formula for Ore Fluxing.

The following question is sent in with request that it be answered in "Concentrates": "What per cent of fluxes is required for smelting an ore containing gold $6, silver 30 ounces, zinc 6%, lead 2%, copper 5%, pyrites 15%? How much coke per ton of ore?"

The question requires more extended answer than could be accorded in the condensed form of a "Concentrate." The percentage of fluxes required for smelting any particular ore must be determined from an analysis of that ore. The nature of the process employed is also a determinative factor in adjusting the proportions of materials used as fluxes. Important differences exist dependent on whether reduction takes place in a blast or reverberatory furnace, whether the furnace is running on a lead or copper basis; what the product is to be—whether bullion or matte, etc. In the above question is omitted the most important data necessary to determining requisite fluxes—the percentage of iron, silica and lime. From the analysis furnished it is supposed that a copper matte is the desired product, and on that assumption the required fluxes for a given product could be calculated if other necessary data were known, such, for instance, as the amounts of silica and sulphur in the ore. These questions are so often asked that herewith is given a formula for a "type" slag from which may be calculated the weights of material required when the analyses of the ores and available fluxes are known:

A = percentage silica (SiO_2) in ore.
B = " ferrous oxide (FeO) " ", going into slag.
E = percentage calcium oxide (CaO) " "
D = " magnesium oxide (MgO) " "
H = " barium oxide (BaO) " "
K = " aluminum oxide (Al_2O_3) " "
L = " zinc oxide (ZnO) " "

The oxides of magnesium, barium, aluminum and zinc may replace lime (calcium oxide) in slags in the following ratios:

MgO = 1.4 CaO.
BaO = .366 "
Al_2O_3 = 1.647 "
ZnO = .691 "

Then the equivalent of CaO (letting C = this equivalent) will be:

$$C = E + 1.4\,D + .366\,H + 1.647\,K + .691\,L. \quad (1)$$

The fluxes have the following compositions:

Iron ore: a = % SiO_2; b = % FeO.
Limestone: c = % SiO_2; d = % CaO.

If the limestone contains MgO, Al_2O_3, etc., the equivalent in CaO must be calculated as in equation (1).

Let x be the number of tons of iron ore required by 100 tons of ore.

Let y be the number of tons of limestone required by 100 tons of ore.

Then:

$$\frac{32}{60}\left(A + \frac{ax}{100} + \frac{cy}{100}\right) = 2\left(\frac{16\,B}{72} + \frac{16\,bx}{7200}\right) \quad (2)$$

And:

$$\frac{32}{60}\left(A + \frac{ax}{100} + \frac{cy}{100}\right) = 2\left(\frac{16\,C}{56} + \frac{16\,dy}{5600}\right) \quad (3)$$

Then:

$$y = \frac{14\,a\,(100\,B - 120\,A) + (120\,a - 100\,b)\,(14\,A - 15\,C)}{14\,bc + 15\,d\,(1.2\,a - b)}$$

And:

$$x = \frac{100\,B - 120\,A - 1.2\,cy}{1.2\,a - b}$$

A Continuous Gold Producer.

An editorial in the issue of the 20th ult., on California as being an exploitable gold region, has occasioned more than ordinary comment, the tenor of the communications received being commendable throughout. In connection therewith are noted three communications from representatives of foreign capital, who, in effect, say that it is not ordinarily supposable that a region "can keep on yielding gold forever." One gentleman, representing French capitalists, writes: "There is prejudice in Paris against California, on the ground that California is an old mining region. Newness of the country seems to be there a necessary requisite for investment in mines."

It is not in Paris alone that such skepticism prevails. In London, as well, exists the same belief regarding California. Indeed, such error is not unknown much nearer home.

So much has been written herein on this subject that it has hard to say anything good that would be new, or anything new that would be good.

Prominence in any field always entails penalty of some kind. It does seem difficult for men unacquainted with the facts, to realize that any region of the earth can continue to send out an average gold yield of $27,000,000 for fifty years without showing signs of exhaustion, and the very fact of its greatness as a gold producer and the half-century of its duration are cited, such amount and duration being considered an argument against possibility of continuance. As one of the communications referred to says: "No region can keep on yielding gold forever." That is, in plain English, the belief exists in some quarters that California is nearly worked out.

Nothing is further from the truth. The great gold yield of California was surface. It is only at a comparatively recent period that quartz mining began, and the era of deep quartz mining has scarcely commenced. The gold of California is as yet comparatively untouched; it does not lie on the surface as it did in the days when California was the sole gold producer, but takes capital to develop it. Other of California's resources have attracted attention, so that in California the gold mining industry constitutes but one of its wealth producers. It is this that has largely tended to overshadow California's greatness as a gold yielding region, while other Western commonwealths in which mining still continues the chief industry attract greater prominence thereby.

Constant development of new ground and continuous profitable working of old furnish evidence sufficient of the fact that California is not a "has been" in gold mining, but is merely a little out of present fashion with some investors, who are naturally more mindful of other newer attractions.

ONE of the usual industrial monographs issued deserves more than ordinary notice. It is entitled "A New Industrial Situation." It is published by the Westinghouse Machine Co., of Pittsburg, Pa., and directs deserved attention to a subject that has not escaped the notice of engineers, but is of even more importance than is generally realized—viz., that gas supplied at reasonable cost, economically conveyed and properly utilized, offers a superior form of fuel, and that the gas engine is a motor that admits of even greater field of economic use than it has attained. The subject is one of importance to this west half of America, and what has been done in mining, marine engineering and manufacturing by the gas engine affords but an index of what may be accomplished in every industry where power is required. The 150 H. P. engine of the Union Gas Engine Co. of San Francisco or the 650 H. P. gas engine of the Westinghouse Electric & Manufacturing Co. of Pittsburg, is but illustrative of the scope of power.

ON page 206 of this issue a communication from A. H. Ricketts indicates an untoward condition of judicial affairs that acts as an additional and unnecessary clog on the mining industry, or, at least, upon those engaged therein who are so unfortunate as to be obliged to defend or maintain their rights. As the matter now stands, the same legal recognition accorded an alien or a resident of another State is denied a resident of California—a condition of affairs that should receive prompt remedial action on the part of Congress. It is only by our national legislature that the door can be opened.

Concentrates.

THE average heat value of natural gas is 1000 B. T. U. per cubic foot.

"ABSOLUTE ZERO" is 460° F. below the zero of the ordinary thermometer.

IT is necessary to get permission of the owner of land to prospect thereon, legally.

MORTAR made from stamp sand is superior to that made with or from the ordinary river or bank sand.

A BANK may apply deposits to a matured debt of a depositor, or to the unmatured debt of an insolvent depositor.

WORDS employed in contracts are to be construed by courts in accordance with their plain, natural and obvious meaning.

THE boiler having the largest fire surface will produce the most steam with equal amounts of fuel, and is the most economical.

CARBON is twelve times heavier than hydrogen; oxygen one and one-third times heavier than carbon, and sulphur twice as heavy as oxygen.

AN article upon which the patent has expired may be made and sold by any one under a name different from the one by which the invention is generally known.

IMPURE WATER may be made almost immediately potable by adding to it the following mixture: Calcium permanganate, 1 part; aluminum sulphate, 10 parts; fire clay, 30 parts.

THE Boer Finance Minister is reported commandeering $200,000 gold per month from the output of the Rand mines. The Transvaal Government is said to be monthly coining 150,000 Kruger sovereigns.

THE suit of H. C. Frick against the Carnegie Steel Co. of Pittsburg, Pa., is to secure a greater price for his stock in that corporation. He asserts that this year's profits of the company will be $42,000,000.

"SEIGNIORAGE" means simply mint charges for coinage. It is ordinarily used in connection with silver, and was, primarily, the difference between 129 and the current price of silver per ounce, less the cost of operation.

WHEN the commutator of a dynamo is turned off, should there be one segment worn deeper than the rest, it is possibly caused by the winding being a little out of balance, sparking and arcing being accentuated at that point.

WITH water pressure 100 pounds to the square inch, to drive a 24-inch Pelton water wheel direct connected to a 200-light dynamo, a 1¼-inch nozzle will give necessary power at 580 revolutions per minute, using 56 cubic feet water per minute.

WHERE a debtor has the election to pay either money or property within a certain time, and he fails to exercise his option and make a tender at the time fixed, he loses his election, and the obligee has the right to demand the money and sue for it.

THE temperature of the flame of an arc electric light, 1000 volts, 2000 candle power, cannot be accurately determined. In an ordinary arc light the temperature of the negative carbon is put at 3000° C., and that of the positive carbon at 4000° C.

STEEL containing 18% nickel heated to a cherry red and worked on the anvil till cold will have the hardness and elasticity, minus the brittleness, of a piece of tempered steel. This temper and hardness is produced by hammering. Quenching in water softens it.

A FIFTEEN-MILE breeze acting on a sail of 25 square feet would have a pressure of 28 pounds, or, allowing for the movement of the sail, 25 pounds. The speed per minute in feet multiplied by the pressure equals foot pounds of power, 440 feet×25=11,000÷33,000=⅓ H. P. so developed.

CAST-IRON pulleys may be lagged with leather without the use of rivets, by first brushing over the surface with acetic acid, which will quickly rust it and give a rough surface; then attach the leather to the face of the pulley with cement composed of one pound of fish glue and one-half pound common glue.

IN a drift gravel mine in California in ancient river channels the bedrock is often metamorphic slate, the "gravel" consisting of small boulders, a little quartz, small pebbles, sand and fine iron pyrites. The cap is usually volcanic cement. The cost of a tunnel 7x8 feet is from $10 to $18 per running foot.

THE fastest steam yacht is the Ellide, built by Mosher, of New York City. It has a speed of 40.2 miles per hour. Ayres & Son, Nyack, N. Y., are building a steam yacht which they expect to attain a maximum speed of fifty miles per hour. Its length is 130 feet, beam 12½ feet. The hull weighs twenty-two tons; construction is largely of aluminum.

SEVERAL systems are in use for sampling ore in place. Where accuracy is desired or essential, a good way is, if practicable, to secure impartial selection and proper distribution of value in the specimens for sample, to have returns checked by duplicates from mill runs from assayers' pulp prepared by accurate methods, recognizing throughout that a little extra judicious expense may save subsequent loss.

MINING explosives my be tested (1) by firing them by means of a loose fuse without a detonator; (2) by firing them in boreholes of different sizes. Experiments should also be made when an air current of high velocity is impinging upon the mouth of the borehole. This test is a most important one, for it has often been remarked that the worst accidents in mines have taken place where the shot which caused the disaster faced ventilating currents of high velocity.

THE Supreme Court of Colorado has held that where, in consideration of extension of time to pay purchase money of mining property, the buyer gives notes secured by deed of trust on the property, and agrees with the seller that he will, till payment of the debt, work the mine in mine fashion, the measure of damages for breach of such contract, for which the seller only has a cause of action, is the injury to the security.

IN the case of Jurgeson vs. Diller (114 Cal. 491) the court decided that work and labor in hauling ore from a mine, cutting and hauling timbers on a mine to be used for drifts in such mine, or extracting ore therefrom, is not "construction, alteration, repair or improvement," and that a laborer doing such work at the instance of a person not the owner is not entitled to a lien therefor, upon the owner's failure to post a notice of nonliability.

WORK is the exercise of force; energy is the capacity for work. Energy expended produces other energy. The sum of all the energies in the universe is always the same. Nothing can produce energy without itself being supplied with an exact equivalent of energy. The above is either right or wrong. If right, then "perpetual motion" is impossible. It is believed to be right. If susceptible of successful contradiction, our dissenting South Dakota correspondent is accorded the privilege.

NO ONE knows or can tell "what is electricity?" There are theories. One of the nicest of these theories is, perhaps, the one that considers electricity a "condition" of atoms brought about by chemical action, as in a battery cell, or by what might be called a severe irritation of the magnetic halo, as in a dynamo, and by other means, such as heat and friction. What this condition is is beyond man's knowledge. It may be a violent rotation, or it may be an equally violent vibration, of atoms. Probably the arc light would prove it to be a vibration. Friction in some form or other is present, as heat is produced before burning or destruction takes place. Even the filament of the best incandescent lamp falls to pieces; it can but work for a time.

IN some of the surface discoveries of mines when a considerable area covered by a blowout of iron oxide, associated or not with purple fluorspar, has been found to run well in free gold, the ground is prospected and developed to the depth of a few feet, and over a certain area, with plows and scrapers, the material so obtained being sent wholesale to the stamp mill, and often giving rich returns. The object of such work is not alone to get all the values out of such rich float, but in hopes of uncovering the vein of which it is the oxidized cap or blossom. In this way the Deerhorn mine, Summit Hill, Colorado, was opened up. In this case nearly $25,000 was thus obtained. The Anaconda or Gold Hill mine, in the Cripple Creek district, is another instance.

THE recent meeting of miners in Redding, Cal., and the subsequent meeting on the 20th inst., of the California State Miners' Association in San Francisco, was to consider and take action on the filing by the Mountain Copper Co. on 3500 acres of mineral land in Shasta Co., Cal., on the representation that it was agricultural land. The case also involved the question of taking up mineral land with "agricultural scrip," both matters being deemed contrary to the best interests of the California miner and prospector. The question is more than a local one, involving, as it does, some important principles. It is understood that in this particular case mutual conference and concession may result in an amicable arrangement.

THE commissioner of the United States land office at Washington, D. C., has ruled that a patent filed on mineral land must be carried through without delay. The person who makes the application on mineral land must proceed with his case or he loses all his rights after a reasonable time has elapsed. The custom has been to apply for a patent on lands, and then, in a great many cases, the person applying has allowed the matter to rest for years. The commissioner bases his ruling on section 2324 of the revised statutes. In making the decision a case involving land in Clear Creek county, Colo., was passed upon. No work had been done upon the land in twenty-five years, and the man who applied for a patent on it had never secured final action on the application.

AT a bore hole sunk by the Wheeling Development Co., at Wheeling, W. Va., which was 4500 feet deep and 4⅞ inches in diameter, and which was cased to the depth of 1570 feet, the strata in nearly as normal condition as possible, and dipping only 50 feet to the mile, the following results were shown: The increase of temperature between points 1350 feet from the top and 2236 feet from the top was about 1° per 100 feet. From a point 2236 feet from the top to a point 3730 feet from the top the increase in temperature was about 1⅔° per 100 feet. From a point 3730 feet from the top to the lowest point at which observations were taken, 4462 feet, the increase was at the rate of 1$\frac{73}{100}$° per 100 feet; that is, from a point 1350 feet deep to a point 2236 feet deep the increase of temperature was about 1° for 100 feet; from a point 2236 feet to a point 3730 feet deep the increase was at the rate of 1° for each 77 feet in depth, and from the point 3730 feet deep to the point 4462 feet deep the increase was at the rate of 1° for each 58 feet in depth. The average increase in temperature from the point 1350 feet from the surface to the point 4262 from the surface was at the rate of about 1° for each 75 feet in depth. The average rate of increase of temperature at the Sperenburg bore hole near Berlin, which is 4170 feet deep, was at the rate of 1° for each 60 feet in depth. At the bore hole of Schladabach, near Leipsic, which is 5740 feet deep, the increase was at the rate of 1° for each 68 feet in depth.

THE Bald Mountain channel of Sierra Co., Cal., affords example of coarse placer gold. The Ruby drift mine thereon has yielded about $700,000. Of this over 10% was in pieces over one ounce in weight, and about 50% was in pieces exceeding one-tenth of an ounce. The gold has been about 895 fine—finer than the gold in the veins from whence it originally came. The probable cause of the greater purity of the placer gold is the oxidization and dissolving of the other constituents of the nuggets, the gold remaing unaltered, at least on the surface. This has further demonstration in the fact that it is the experience of California hydraulic gravel mining superintendents, when considerable percolating water is found in the gravel breast, that there is usually a noticeable increase in the purity of the gold, at times to the extent of nearly 1% more than the adjacent gold not so affected.

THE Chilean mill, mentioned in last week's "Concentrates," is sometimes associated with the idea of the arrastra, from which it may be considered to have been developed. It is like a millstone set on edge, and so arranged that it will revolve in a circular track, the axle upon which it revolves being pivoted at one end, and a mule hitched to the other, as used in Peru. The Chilean mill and the arrastra both serve a purpose, the Chilean mill reducing the assorted spalled ore to pea size, thence to the arrastra, where about one-half the charge is first placed and thoroughly moistened as the peon revolves, about two and one-half ounces quicksilver being added as the grinding progresses, and the remainder of the charge is put in. From twelve to sixty hours is the limit for grinding, which depends on the nature of the ore and coarseness or fineness of the gold, amalgamation in the case of coarse gold being sometimes reached in twelve hours; and in the case of fine gold requiring even more than sixty hours.

TO MAKE nitrate of silver out of pure silver, place the silver in a beaker and pour into it three-quarters of a fluid ounce of strong nitric acid sp. gr. 1.4 for every ounce of metal. The beaker is heated till the whole of the silver dissolves. The solution is then poured into an evaporating basin, and the excess of acid driven off by boiling. The operations should be conducted in the open air. The salts left may be recrystallized by dissolving in the smallest possible quantity of boiling water, allowing it to cool. The crystals of pure nitrate of silver will gradually form. The salt remaining in the mother liquor can be recovered by evaporation. To prepare chloride of gold, the copper in the coin must first be eliminated. The gold coin is put into a beaker, and a mixture of three parts of hydrochloric acid and one of nitric acid is poured into it and heat applied until the metal is dissolved. The excess of acid is then expelled by evaporation. The impure gold chloride, when free from acid, is dissolved in boiling water, and a cold saturated solution of protosulphate of iron added, till a dark precipitate of pure gold is no longer produced. The precipitate of gold must be poured on a filter and washed by pouring boiling water constantly over it, till the wash water no longer produces a precipitate with a solution of barium chloride, proving that the gold is free from excess of sulphate of iron. The gold is again dissolved in nitro-hydrochloric acid, the solution evaporated to dryness, the latter part of the operation being carried on slowly to prevent spurting. The yellow crystalline chloride of gold thus prepared should be preserved in a well stoppered bottle or a sealed tube, as the salt is very deliquescent.

ALUMINUM wire is used for electrical transmission by the Snoqualmie Falls Co., Seattle, Wash., and the Yuba Power Co., Smartsville, Cal. In neither case is there reported entire satisfaction, though the standard of criticism can not be rigid as the idea can not be considered to have as yet entirely passed the experimental stage. A test of an aluminum cable was made recently by R. C. Carpenter. The cable is to be used for transmitting electric power from the falls of Apple river, Wisconsin, twenty-one miles to St. Paul, Minn. Through a single cable consisting of 7⅛-inch wires, 1500 H. P. will be transmitted, the voltage employed being 25,000. The chief disadvantage in extensive use of aluminum is the difficulty of soldering or brazing. To overcome this a sleeve joint has been designed for splicing, and three of these splices were tested. The splices are made by inserting the ends of the two cables to be joined in an aluminum tube about 25 inches long for a distance of about 9 inches, and then twisting the ends of the tube for six complete turns. The length of the twisted tube becomes 7⅜ inches and the estimated weight per foot of splice is 0.35 pound, while the same weight for the plain cable is estimated at 0.126 pound. No solder is used in the splice. The area of the seven wires amount to 0.0915 square inch. The cable was broken by placing the ends in the jaws of a testing machine and supplying the required power. Considerable difficulty was experienced in applying the stress so as to strain each wire in the cable equally. All breaks were due to the wires giving inside or below the splice. In no case was the holding power of the splice impaired, nor were all the wires of the cable fractured. The breaking load in pounds per square inch of metal was for the three cases, 16,550, 18,450 and 19,350.

Some Sample Inquiries and Their Answers.

A large number of questions are weekly received at this office, embracing requests for information on nearly everything connected directly with mining, mining law, metallurgy, assaying, chemistry, electricity, natural forces, different processes, machinery and all manner of appliances and devices connected therewith. An attempt is weekly made to answer most of these questions in "Concentrates," omitting the question itself to economize space, and supplying procurable information in brief, concise phrase. The information thus given is as near correct as possible; though, of course, only approximate, but the favor with which such matter is received indicates the value of the service. Not all the questions are answered; that would be manifestly impossible. Theoretical or abstract inquiries; questions that are evidently hypothetical, and those not within the scope or province of the paper are not usually given detailed attention; many are answered by mail, but the bulk of the inquiries received find answer on the page of "Concentrates." Many of these questions take considerable time and effort to answer, and quite often, after, sometimes, a month of inquiry, "Concentrates" confesses inability to give the desired information. What is therein published is, at best, only an effort, more or less successful, to furnish practical information to practical men on matters that concern their practical relations with problems that come up in their daily lives. The idea of "Concentrates" was first suggested by the fact that quite often from three or four different localities came the same general question, and one answer sufficed. It was often apparent that a question from an Idaho miner or one that a Montana superintendent asked, would, if properly answered, furnish a Utah or Colorado or California man with some useful hint regarding the same or kindred matter, and frequently readers have stated such has been the case. It has been said by old experienced miners that some of the answers are simple, indicating the absence of even rudimentary knowledge on the part of the inquirer. That is so; when these same experienced men began mining, they, probably, didn't know any more about those things than do some beginners now, who may, many times, be saved considerable costly experiment or experience by a few lines. Indeed, as one old prospector puts it: "Had I had such 'pointers' as I weekly see in the MINING AND SCIENTIFIC PRESS when I started out twenty years ago, they would have saved me many a hard knock and many a hundred dollars." But for one primary question put, come twenty that require research and reference to even approximately answer with any degree of correctness. Occasionally come questions that would require a technical treatise to even partially answer. It may be interesting to append a few questions received during the week. In each case the name of the writer is omitted:

Kindly publish answers to the following questions from an old subscriber:

When copper ores are unusually pure, say, a black oxide, without lead, iron, arsenic or antimony, is sulphuric acid commonly used, and is it the best for making a solution with a view of electrically depositing copper?

With such solution of such ores (possibly containing a few ounces of silver), approximately how much copper can be deposited per horse power in twenty-four hours? Of course, conditions must greatly vary this result, so only an approximate answer is desired.

Give the present method of electrical deposition of such ores, including recovery of contained silver.

Silverton, Colo.

To correctly and satisfactorily answer these questions would require either the writing of a complete treatise on the subjects, or else detailed research in the indices of the MINING AND SCIENTIFIC PRESS for the last six or eight years, where, in the several articles on the metallurgy of copper, is to be found the desired information.

Can a locator commence assessment work on the last day of December and hold the location lawfully?

Carrville, Cal.

This is one of those questions that cannot be intelligently answered without full knowledge of the facts. If the Carville, Cal., man located that claim any time during '99, he has all of 1900 to do the necessary assessment work thereon for the period ending Dec. 31, 1900. If he located it prior to '99—that is, as late as any time in '98—and did no work thereon aggregating in value $100, it is doubtful if beginning the necessary work Dec. 31, '99, would enable him to hold it if any one desired to legally relocate it after Jan. 1, 1900. The law, however, is lenient, and in those cases the good faith of the locator, his intent to comply with the meager federal requirements, is largely considered. No one can initiate a right by force or violence, and if the original locator was found doing requisite assessment work begun before the claim was "jumpable," and diligently prosecuted, the court would doubtless give him the benefit of the doubt if the matter came before it.

I want a plan or plans for building a cheap jig concentrator for lead-silver quartz. There is considerable silver-lead ore in this county that runs from $10 to $12 per ton, and would concentrate eight to fifteen to one, but the owners are too poor to build mills; in fact, their prospects do not yet justify a mill. Such information as you can give will be greatly appreciated by many miners.

Loomis, Wash.

One good plan is a hand jig. We have had an old, experienced miner draw plans and description of a jig that he has successfully used in a similar case, and as soon as the plans can be redrawn and engraved the illustrated matter will be published. Meanwhile, how would it do to try a 2-stamp, triple-discharge mill with a good sizing table, or suitable concentrators? Both mill and concentrator could be had for less than $1000, and would be of effective value. If our inquirer is unable or unwilling to put up that amount, he and his neighbors might make a joint affair of it. On page 106 of catalogue 12, second edition, issued by the Risdon Iron Works, San Francisco, is a good illustrated description of an ordinary Hartz jig. The Loomis man might buy the iron-work and build the woodwork himself.

I want to construct an arrastra and to find out the way to run it.

Globe, Arizona.

In the issue of Jan. 14, '99, and in that of Jan. 28, '99, appeared two exhaustive articles, occupying four pages in all, profusely illustrated, on "How to Build and Operate an Arrastra," each article separate and complete in itself, and written by experienced practical miners.

It is desired to force twenty-five gallons of water per minute to an elevation of 500 feet, through a line of pipe 11,000 feet in length—the pipe will contain no bend of less radius than 50 feet, and only ten of these—what will be the most economical size of pipe to use and what horse power will be required? By answering the above in "Concentrates," you will greatly oblige.

White River, Cal.

Allowing for friction or resistance, the proposition is to lift 210 pounds water 530 feet per minute through an unusually long pipe. Nothing less than 3-inch pipe would be available. With that size pipe, theoretically, would be required 3.37 H. P.; 6 H. P. would be none too much.

Please give me the name of the manufacturer of the Acme pulverizer. I think it is made in Philadelphia.

Spokane, Wash.

We are unable to furnish the information.

Can you inform me how to remove gold amalgam from copper plates without injuring the plates?

Shingle Springs, Cal.

One good way to free copper plates from gold is to put them over a charcoal, coal or coke fire, and slowly evaporate the quicksilver off them. Where admissible, the fireplace of a spare boiler can be utilized, using a thin, red fire. After the entire evaporation of the quicksilver, the plates should be slowly cooled, rubbed with muriatic acid and put in a damp place over night, then rubbed with a solution of sal ammoniac and niter, and again heated slowly over a red fire. They must not be allowed to get red hot; when the proper degree of heat is reached, the gold scale will rise in blisters, when the plates should be taken from the fire and the gold scraped off. Any part of the plate on which the gold has not blistered should be rerubbed with the solution and again fired. The gold scales should be collected in an earthen dish, and covered with nitric acid, till all the copper is dissolved, when the gold can be smelted in the usual way; but after it is melted corrosive sublimate should be put in the crucible till a blue flame ceases to be given off. An excellent article on this subject appeared on page 176 of last week's issue.

We have a very large deposit of low-grade copper ore and intend to erect a plant for the manufacture of sulphide of copper for the use of silver mills for the home market. Any information you could give us in respect to style of furnace and mode of reduction for a ten or fifteen-ton plant would be gladly received.

Acampo, Chihuahua, Mexico.

This gentleman appears to be too indeterminate in his statement. Probably correspondence with manufacturers of reduction plants might accord him a degree of exactness as to intent at present lacking. He says he wants to make "sulphide" of copper. Probably he means copper sulphate, or bluestone. In case his ore is a sulphide high in sulphur he can roast it in heaps and leach the copper sulphate out with water, and finally with a dilute solution of sulphuric acid. If the ore is a sulphide low in sulphur he will have to crush to about ¼-inch mesh and finer, roast in hand reverberatory furnace, or any of the many automatic furnaces, and leach in tanks with water and dilute sulphuric acid. If the ore is oxidized, carbonate of copper or oxide of copper, leach with dilute sulphuric acid. The resulting solution of copper sulphate has to be concentrated to say 36°–40° B. and allowed to cool gradually, so as to crystallize out the bulk of the copper sulphate, then either concentrated again or used over for leaching out fresh copper. Probably the wisest thing for our correspondent to do would be to hire a good man who knows all about this process and let him run it.

How can I best clean silver-plated amalgamating plates and how best restore dirty quicksilver?

Bismark, Mont.

A weak solution of cyanide of potassium or a strong solution of salt and water is recommended, using a brush with each. The presence of grease or oil is counteracted by the introduction into the battery of a saturated solution of wood ashes. Quicksilver is usually cleaned by washing and straining through a chamois bag. When it is dirty, or mixed with foreign substances, it must be retorted at a low temperature to thoroughly clean it. Reverting to cleaning the plates: a solution of vinegar and salt is recommended by some; dilute nitric acid is also used, the plates being at once rubbed with quicksilver after being washed with clear water. At very long intervals, or when closing down for an indefinite time, it is sometimes advisable to "sweat" the plates—that is, to pour a quantity of scalding hot water over them for some time. See also concluding sentence of answer to above question from Shingle Springs, Cal.

What is a contact vein? What is contact ore deposit? What is contact matter? How is an assay for gold and silver made inaccurate by the freezing of a cupel or scorifier?

Wardner, Idaho.

When one wall is composed of eruptive rock the vein is called a "contact." For instance: a metal bearing vein will often occur at the "contact" of a dyke and sedimentary rock, as porphyry and limestone. The "deposit" or "matter" may occur wholly within the limestone, as a replacement of the original mineral, and in other cases the mineral is wholly confined to the dykes. In either case it would be a contact vein. Some melted metals absorb oxygen from the atmosphere and expel it while cooling. If the metallic content of a scorifier or cupel is cooled suddenly on the surface, while the scorifier or cupel is still highly heated, the gas, when expelled from the interior, breaks forcibly through the solidified crust, carrying with it some molten metal. It is supposed also that solidification and re-melting increases the tendency to absorption by the cupel, but this is doubtful.

Can you or some of your readers tell what flux is necessary in making an assay of sulphide ores for gold containing graphite to overcome the loss of values and reason of same in ores containing graphite?

San Diego, Cal.

The occurrence of graphite in commercial sulphide ores in appreciable quantities is so unusual, and such little attention, if any, has been given such a combination, that it is difficult to explain the cause of loss of gold in the assay and furnish the remedy therefor, if indeed, such loss is due to the presence of graphite. Some suggestion might be offered if the composition of the ore were known. The sulphide of molybdenum is frequently mistaken for graphite. A loss might be occasioned by the deflagration of graphite causing a sputtering. It is suggested that the graphite be eliminated by panning or otherwise previous to the assay, and a comparison of results made. This will indicate the extent of influence of graphite in the loss.

What is the best reagent to use in making water suitable to use in a steam boiler which is strongly impregnated with ammonium sulphide?

Randsburg, Cal.

A similar question was given complete technical answer in "Concentrates" in the issue of the 10th inst.

What is the relative heat-producing capacity of one cord oak wood, one ton coal and one barrel (42 gallons) crude petroleum, or, in other words, how many heat units in the above quantities of the material mentioned?

Sulphur Creek, Cal.

Ordinarily, it has been determined by tests that two cords oak wood equal one ton steam coal; one pound coal will evaporate ten pounds water. At a recent Los Angeles, Cal., test, one pound crude petroleum evaporated 17.3 pounds water. Oak wood is credited with: calories 4750, British thermal units 8550; steam coal, calories 8500, B. T. U. 15,060; petroleum, calories 9700, B. T. U. 17,560.

This is a very interesting question, but an exact technical answer is difficult to briefly give, as so many elements enter into its correct solution. "The Calorific Power of Fuels," by Poole, is recommended as a good work on the subject.

I want through "Concentrates" some information on sampling mills, and if you could give it to me, as you have been doing through your paper, I would be greatly obliged. I wish to have an estimate on the cost of a sampling mill of from twenty-five to fifty tons a day. It is for a copper district (some gold and silver) that is fifty or sixty miles from a railroad, and the small mines

and prospects have at the present time such a limited output that they must all work through a common sampler in order to make carload shipments and get money to keep up the work. It is thought a small sampling works would make this possible. Give me an estimate of cost and the necessary crushing and sampling machinery. Also please state the proportion of a lot of ore that is taken to run the average sample down. State the proportion for sampling lots of ore of from one to twenty-five tons. I know in some lots they take about one-tenth to run through the sampler, taking every tenth shovel or wheelbarrow full. What are the usual charges for sampling? What is the profit of the sampler when they buy the ore and ship to the smelters.

Mercur, Utah.

To make a "Concentrate" in answer to such a question or series of questions would be impossible. As to the estimate of cost, if our enquirer will write to reputable manufacturers of or dealers in mining machinery, such as advertise herein, he can get correct reply. From the statement he makes, such an enterprise should prove of profit. The proportion of ore taken from a lot for sample varies with the nature of the material being sampled. There are ores of such uniformity in physical characteristics and value that a portion from one part of the lot will fairly sample the whole. There are others which require intimate mixture and portions taken frequently in order to sample satisfactorily. A common practise, in sampling by hand, is to take one shovelful in five. Automatic samplers are adjustable and would be regulated to suit the ore.

Please furnish me with, or place me in the way of securing, information and data in regard to the present and prospective use of water power in the various countries of the world.

Seattle, Wash.

This is one of the questions occasionally received that does not admit of answer. Life is too short.

Concerning an electrolytic process, where it is wished to produce pure copper directly from siliceous ore, fuel being cheap and labor reasonable, and where the ore does not carry any lime, the copper being in the ore as malachite with some little glance, can you give me the name of some practical authority thereon?

Albuqueque, New Mexico.

Mr. Alfred von der Ropp, superintendent Selby Smelting & Lead Works, Selby, Cal., is good practical authority. Edward Peters, Dorchester, Mass., is also recommended thereon.

What possibility is there to handle bismuth? Is there a market for same?

Llano Station, Sonora, Mexico.

The third "Concentrate," second column, page 63, issue of the 20th ult., answers these questions.

What is molybdenum and molybdenite, or ore of molybdenum, of which a discovery is believed to have been made in this county? In what character of rock and what combinations is it found? What is the appearance of the ore and of the metal? What are its principal uses? What is its commercial value, where worked and marketed?

Bishop, Inyo Co., Cal.

Molybdenite is not uncommon; it has been found in California allied with various other ores and in the same rock in which they are ordinarily found: In El Dorado county, at Cosumnes, with copper ores; at Fresno Flat, Fresno county, at the Beveridge mine; near Independence, and not very far from the residence of our inquirer; at the Excelsior mine, Nevada county; near Campo, San Diego county, and several other southern California localities. Molybdenite is a soft, metallic, scaly, foliated mineral of a glossy lead color. It is the sulphide of molybdenum. Molybdenite is not used on the Pacific coast. Concentrated, it is worth about $200 per ton. Molybdenum is a soft metal, easily filed and polished, malleable when hot, does not scratch glass, specific gravity 9.01. Its commercial value is as a deoxidizing agent in steel manufacture. The Bethlehem Steel Co., Bethlehem, Pa., can furnish further desired information.

Please advise me through "Concentrates" what processes are in use for winning the silver from silver-lead base bullion.

Chicago, Ill.

The extent of the subject precludes possibility of compression. Read some standard up-to-date work on the subject, and communicate with men prominently engaged in the work.

There has been quite a controversy among our millmen in this part of the country as to the best drop for a 10-stamp battery, and have agreed to leave it to the MINING AND SCIENTIFIC PRESS for decision — ten stamps working on one shaft. Please give us your opinion through the PRESS.

Lundy, Cal.

It is a question that however answered will not receive general acquiescence. Probably no standard order of drop can be given. In a 5-stamp battery, for instance, some millmen say 1, 3, 5, 2, 4 is a good order of drop; others insist that 1, 5, 2, 4, 3 is better. The argument of the latter is that that makes uniform the splash of water and pulp in the mortar. Thus, No. 1 dropping, sends the water through the battery lengthwise, which No. 5, in falling, catches and throws back; the same with No. 2, sending it back to No. 4 in its descent, No. 3 equalizing the swash. The same principle of practical work is believed to make good the order of 1, 6, 3, 8, 5, 10, 2, 7, 4, 9, in answer to our Lundy correspondent.

Can I locate and mine a river bed embraced in an agricultural claim? The river is rich in placer; on either side the land is barren, but is filed on as agricultural. Can I work the river bed in spite of agricultural claims?

Kingsburg, Fresno Co., Cal.

Only public mineral lands are subject to entry under the mining laws. Any tract to which a private claim has legally attached does not come under the head of public land. Hence, off-hand, the answer would be: "No, you can not." But it were well to look into the legality of the "agricultural claim." Has the agricultural claimant a right to his claim? A river bed is not ordinarily the subject of a legal private claim of any kind. Submit the exact specific facts to a good mining lawyer.

A question comes up which it has been agreed to leave to you for decision. We have a six-mile pipe line—8-inch pipe, head 130 feet, flowing or carrying regularly about 12 cubic feet of water per minute. If 20,000 gallons of water were added at once, or nearly so, to the regular supply at the head, how soon would the increase of discharge at the lower end be noticed?

Pinos Altos, N. M.

In answering this question we have not gone into close figures and are not taking fractions or decimal points into consideration, but simply give an idea of data pertaining to this problem: Eight-inch pipe carrying 12 cubic feet per minute will carry .2 of a cubic foot per second. With riveted pipe with ordinary bends, the velocity will be approximately 1 foot per second. Six miles of pipe would contain 31,680 feet and discharging the above quantity will have 5 feet friction loss per mile. To absorb 130 feet head in friction loss and get the maximum capacity, we can stand 21.6 feet loss per mile. The maximum velocity with this length, size and head of pipe is 2.65 per second, but owing to the pipe figured on being riveted and not new, there would not, in this case, be over 2.3 feet velocity, to absorb the amount mentioned in friction. This would show a discharge of 29.4 cubic feet per minute, minus the 12 feet which is the main supply, and will allow 17.4 cubic feet per minute of the 20,000 gallons additional to be discharged. At 2.3 feet velocity per second, it will require 13,774 seconds for the water to be discharged after being admitted to the upper end of the pipe. This will be 3.826 hours from the time the first additional water is admitted into the orifice at the upper end of the pipe before it is discharged, and the entire 20,000 gallons will enter the upper end in 150 minutes. As the line will contain 82,722 gallons, including the 12 cubic feet per minute, the water will be admitted in two and one-half hours. The first discharge will be perceptible in 3.826 hours and the normal flow of 12 cubic feet per minute will commence two and one-half hours later.

The intent in answering such questions in such a way is to give approximately correct information or tell where it can be had; that is, to aid the inquirer so far as possible in his manifest intent to find out further regarding the subject of his inquiry. No answer is absolute or final, and if in the multitude of questions so answered is found even further fragmentary knowledge, the sincere desire of the paper to be useful in the mining and scientific world is satisfied.

Fineness of California Gold.

TO THE EDITOR:—In your issue of January 20th appeared, under the caption of "Fineness and Value of California Gold," a table compiled by the superintendent of the Mint at San Francisco, giving the average fineness of gold produced in various counties of the State.

The table appears to me to be based on insufficient data, if compiled from records of deposits which only cover a period of several months.

To make such a table entirely reliable, it should be compiled from data extending over many years and embracing values reaching into millions of dollars. When made under such conditions it will be found that the average fineness of gold varies but little in the different counties, while single localities or individual mines, often close together, present great variations, chiefly traceable to the physical and genetic conditions of the various deposits.

I subjoin the following table of the fineness of the gold from various points in central and southern Plumas county, from data collected during a period of forty-five years, and based upon bullion values exceeding $3,000,000.

For most of this information I am indebted to the courtesy of Messrs. Thompson & Kellogg of Spanish Ranch, whose records of purchase and shipment of gold dust and bullion extend from 1860 to the present day:

No. Localities.	Class of mine.	Fineness, thousands.
1—Fale's Hill	Hydraulic	970
2—Corneliusais Gulch	Placer	968
3—Mountain House	Placer	960
4—Diadem Mine	Quartz	959
5—Badger Hill	Hydraulic	948
6—Eagle Gulch	Placer	943
7—Bean Hill	Hydraulic	940
8—Gopher Hill	Hydraulic	938
9—Blackhawk Creek	Placer	905
10—Emigrant Hill	Drift	904
11—Butterfly Valley	Placer	902
12—Grub Flat	Placer	900
13—Smith's Hill	Hydraulic	900
14—Green Flat	Placer	890
15—Rich Bar	Placer	886
16—Mill Creek	Placer	885
17—Twelve Mile Bar	Placer	885
18—Shenandoah	Quartz	882
19—Long Bar	Placer	880
20—Rich Gulch	Placer	850
21—Soda Bar	Placer	848
22—Rush Creek	Placer	845
	Average	908

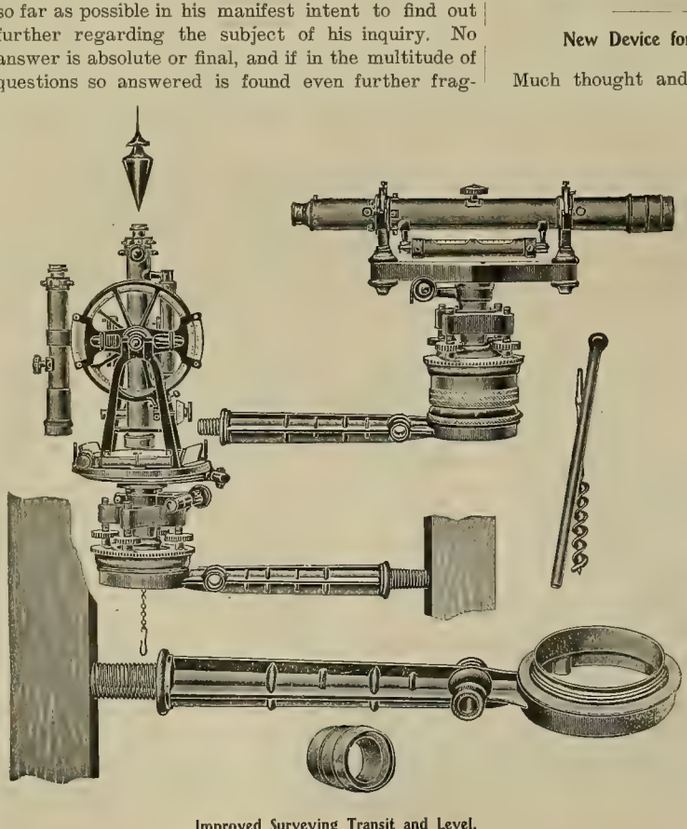
If the product of the quartz mines in the northern and eastern sections of the county were included in the list, the result would probably be somewhat lower.

J. A. EDMAN.

Meadow Valley, Feb. 10.

New Device for the Surveying Engineer.

Much thought and study have been given to the perfection of instruments of precision used by engineers and surveyors, and progress continues to be made in the design of surveying instruments. Herewith is illustrated a short focus lens attachment, which enables the observer to focus objects by the main telescope of the instrument within a distance of 3 or 4 feet, being to the transit or level what the spectacles are to the human eye. One of the devices is shown separate and one is attached to the level in the accompanying cut. It is made by a Boston, Mass., manufacturer. The instrument bracket, by which the transit or level can be set up in cramped places, such as in the shafts of a mine or in tunnels, when even the extension tripod can not be used to advantage, is a serviceable addition to the outfit of a mining engineer. The transit can be centered from above or below a given point. An auger and lever are furnished, wherewith the bracket can be screwed to the timber of a mine.



Improved Surveying Transit and Level.

IT is claimed that the dust of the De Lamar, Nevada, mill is responsible for the death of fifty men.

A Door Closed to Miners.

To the Editor:—The case of Blackburn vs. Portland Gold Mining Co., recently decided by the Supreme Court of the United States, possesses more than ordinary interest, in that it relegates to the State courts a line of litigation which has recently been accepted by the lower Federal courts as within their jurisdiction, and which the State courts will not entertain without some qualifications.

It appears in that case that the plaintiff alleged the right to the possession of and patent for a part of a lode claim for which the defendant had applied for a patent. Both complainant and defendant were citizens of the State of Colorado, and the suit was brought in the United States Circuit Court of that State upon the theory that the court had jurisdiction of the case as one necessarily presenting a federal question. The case was dismissed for want of jurisdiction, and the complainant carried the case up on writ of error.

The defendant moved to dismiss the case in the Supreme Court on the grounds: "that the court had no jurisdiction, either of the parties or the subject matter of said suit; that both the plaintiff and defendant in said suit are citizens of the State of Colorado, and the same is not one wholly between citizens of different States; that it appears from the complaint that said suit is one which cannot under the Constitution and statutes of the United States be brought into the Federal Court."

The Supreme Court affirmed the judgment of the Circuit Court, Justice McKenna dissenting.

In the course of the Supreme Court's opinion it is said: "Without undertaking to say that no cases can arise under this legislation (Secs. 2325-2326 U. S. Rev. Stats.) which turn upon a disputed construction, and therefore presenting a question as essentially federal in its nature, we hold that clearly where a patent is authorized to be issued to the party in possession, the statutes refer the contest to the ordinary tribunals, which are to determine the rights of the parties without any controversy as to the construction of those Acts, but are to be guided by the laws, regulations and customs of the mining district in which the lands are situated. (But what is to become of a case involving a mining claim situated in no existing mining district? And there are many such.) In a case, therefore, like the present, where federal jurisdiction does not arise because the parties are citizens of different States, and where no question is made as to the meaning and construction of the statutes of the United States, the State courts are to be regarded within the letter and meaning of Section 2326, as courts of 'competent jurisdiction to determine the right of possession.'"

This distinctly overrules the case of Shoshone Mining Company vs. Rutter (87 Fed. Rep. 801) and the later case of McFadden vs. Mountain View Mining Company, in both of which the Circuit Court of Appeals for this circuit held that such a suit arose under the laws of the United States, and was within the jurisdiction of the Circuit Court and under the authority of which adverse claim suits, so called, as well as suits arising under other sections of the mining Acts of Congress, have lately been brought and maintained in this circuit, notwithstanding the fact that there was no diverse citizenship shown as ground for federal jurisdiction, or that any right, privilege or immunity under the Constitution or laws of the United States were specially set up or claimed or that any such right was denied them or that the necessary effect in law of the judgment would be the denial of any right claimed under the laws of the United States.

Under the rule laid down in Blackburn vs. Portland Mining Co. the great mass of mining litigation must now be instituted and maintained in the State courts with but little chance for review by the United States Supreme Court. A proposition which is emphasized in Mining Co. vs. Turck (150 U. S. 138).

While the import of the decision in the Blackburn case is to practically close the door of the Federal courts to the miner in cases involving title to mining claims and trespass thereon, the State courts are none too eager to entertain this litigation, for in Altoona Co. vs. Integral Co. (114 Cal. 100) our Supreme Court has held that the jurisdiction of the State court over an action to quiet title to a mining claim, although brought by a person claiming adversely to the applicant for patent in conformity to the mining Act of Congress, is not based upon Section 2326, Rev. Stats.; that the jurisdiction and procedure governing such action depend entirely upon the Constitution and laws of the State, and it is immaterial whether the judgment therein can be made available in the land office or not. Consequently, it is not essential that such action should be commenced within thirty days from the time the claim was filed in the Land Office as required by said section. This view was also taken by that court in Quigley vs. Gillett (101 Cal. 462) and is approved by other courts of last resort in some of the other mining States.

This is in consonance with the doctrine that Congress cannot vest any portion of the judicial power of the United States, except in courts ordained and established by itself. Hence, Congress cannot force the courts of a State to entertain jurisdiction in any case and our Supreme Court has certainly shown its disinclination to accept jurisdiction of a case merely because it is such a one as Congress has provided may be commenced in a court of competent jurisdiction.

But the mining Acts of Congress properly do not attempt to confer any jurisdiction by expression upon the State courts not already possessed by them, although the Supreme Court of Nevada has held in 420 Mining Co. vs. Bullion Mining Co (9 Nev. 248) that the object of the law was to require parties protesting against the issuance of patent to go into the State courts and there have the controversy determined.

Under the law as now interpreted by the courts the rights of the miner are anomalous, as in a great majority of such cases these rights must be determined by the laws of the United States in some court not created by the same power that enacted such statutes and there, says the Supreme Court of Nevada in 420 Mining Co. vs. Bullion Mining Co., supra, "be tried by the same rules, governed by the same principles, and controlled by the same statutes that apply to such actions in our State courts, irrespective of the Acts of Congress," until Congress affords relief by proper legislative action.

San Francisco, Feb. 21. A. H. Ricketts.

Some Notes on Gold Dredging.

To the Editor:—The articles in the late issues of your paper by Mr. Theo. F. Von Wagenen on dredging for gold are good, and in my opinion are the ablest statements of downright facts that have been recently written on the subject. It is true, unfortunately for all concerned, that men who have the management of dredging plants are often without practical knowledge of mining or of the mechanical work required to build and operate a mining dredger.

On Snake river it has been the practise for such inexperienced men to pick up some miner who claimed to have made a success on a small scale and adopt his method, not knowing that there are many ways of saving gold in a small way that will not work wholesale, or that the miner probably did not save all the gold with his small machine. After such systems have failed on a large scale, they have been torn out and other similar ones put in at large expense. This operation has been repeated until at last the company represented has refused to put up more money. Then debts have been incurred, for which the property has been attached, and finally sold for just enough to satisfy the creditors.

This programme has been repeated so many times that it has given Snake river a bad reputation in that regard. But in nearly every instance of failure there have been men who have already tried the systems about to be used, or seen them tried, who were generous with their dearly bought knowledge, but the new men placed more confidence in their own judgement and sometimes said that one man might make a method work with which another had failed, and so went to their rope's end. Men have always risen on the stepping stones of the experience of others, but in Snake river mining they have preferred to hew their own steps as they went along until their knives dropped from their hands and they were helpless.

I have had practical experience in trying to save fine or flour gold and have kept informed in regard to the different systems used, and these are a few general conclusions that I have reached:

First.—There is money to be made on Snake river, if the proper appliances are used: but I believe that only the uncovered bars should, as a rule, be worked. The average value is not high enough to warrant the expense of removing large amounts of dead material. But this covering may be gradually removed by the action of the river, if care is taken to turn the current at high water through some shallow channel running through the strata over gravel bars. Thorough prospecting would determine where such labor should be done and no labor would be thrown away. It would take time; but in the meantime uncovered bars could be worked.

Second.—The bucket dredger does not seem to meet all requirements. There are always snags, willow roots, submerged clumps of heavy grass sod, large stones or layers of clay that strain the dredger and bend or tear off the buckets. Besides, the values are partially concentrated in the bottom of the buckets by their motion and are carried over and lost. This is the case particularly where there is clay in the formation. I would use, instead, a scoop dredger of large capacity and very strongly built. The delays caused by repairing breakages have been hitherto one of the principal causes of failure.

Third.—No dredger should be built without a strong, thoroughgoing stacker for carrying away the tailings.

Fourth.—A continuous system of concentration and amalgamation should be used, involving no delays for any purpose. The gravel should pour in like a stream and be carried on steadily over the machinery used, until stacked securely on a dump out of the way of future operations.

Fifth.—That system is the best, all other things being equal, which requires the fewest men, as it is imperative that the operating expenses should be kept down to the lowest possible figure.

Sixth.—The manager should be a man who, at least, can tell the value of the material accurately, and, what is of greater importance, the amount of gold left in the tailings. For, whatever system is used, the tailings should be constantly tested, as a leak here is very disastrous, when the values are small in the material worked.

Seventh.—There are many fairy tales told of the values on Snake river. I have prospected over a large part of it, and have come to the conclusion that 8 cents per cubic yard is a fair average. The values are not uniformly distributed, running from $1 in places all the way down to nothing, or nearly nothing. Occasionally, a small spot is found that runs several dollars per yard; and, while such streaks help to raise the average value, they often deceive the prospector, as well as the promoter, as to the general character of the ground. Three cents per yard is a close estimate of the cost of working the material, if large quantities are worked without wasteful delays. A dredger that actually handles 1000 yards in ten hours and saves the gold must make a good profit on the money invested; but, to my knowledge, no dredger on Snake river has done this up to the present time.

Eighth—Amalgamating plates do not save all of the gold, and are wasteful in quicksilver. Amalgamation is prevented by the slimes in the material and by the coating of much of the gold.

In conclusion, will say that I know of only one system that saves practically all of the values with a degree of economy that makes it profitable to work low-grade ground with profit, and when that becomes better known and generally adopted, dredging for gold will become an established and most profitable business. Miner.

Mills Loaded With Orders.

It is useless to try to say what to-morrow may bring forth. The iron and steel mills are everywhere completely loaded up and loaded down with business and hundreds of customers are shaking their fists with orders in them at the manufacturers. Considerably more business is being offered than is accepted. The fundamental point now is, Will prices advance to a still higher level? The ore consumers, that is to say the furnace interests, have made any serious advance practically impossible by contracting for their ore at fixed prices, as above mentioned. Pig iron need not cost much more next year than now. This assurance is the basis for the present confidence in next year's prices, but manufacturers are not willing to go much further into the fog than they now are. There is a heavy demand for plate and structural material, and urgent buyers are known to have paid as much as $10 to $12 a ton above the asking price.—Implement Age.

In the Days of '49.

Writing from Rocky Bar, Idaho, renewing his subscription, Mr. John P. Martin says that he first began his regular annual subscription to the Mining and Scientific Press when he and his fellow miners were pioneer hydraulic miners. He says: "I think we opened the first hydraulic mine. The first hydraulic hose was also used in our diggings on Manzanita hill, near North San Juan, Nevada county, Cal. We sent to New York and got several hundred feet of fire-hose from the city hall. I had been a member of No. 29 Hose Company, New York City, and was well acquainted with the hose used by the fire department of that city. My partner, Mr. Kilby, had been a member of the fire department in Williamsburg; so it was a small matter to get the hose. In those days all such material had to come around the Horn and I think it was 199 days getting around, but it got to North San Juan finally."

The seventy-eighth meeting of the American Institute of Mining Engineers is in session in Washington, D. C., this week. Director C. D. Walcott of the United States Geological Survey read a paper on "The Work of the United States Geological Survey in Relation to the Mineral Resources and Mining Industries of the United States."

The United States steamer Nero, during its recent survey for a transpacific cable, in its deep sea soundings, made one sounding near Guam island marked 5160 fathoms and another 5269 fathoms, only 66 feet short of six statute miles. This is deeper than the highest mountain peak on the land surface of the globe.

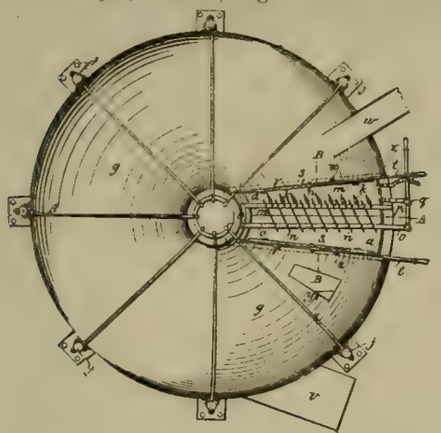
Wherever or whenever the price of gas or fuel suitable for such use ceases to be prohibitive the gas engine comes into equal domain with steam, electricity and compressed air. In New York City illuminating gas suitable for use in a gas engine is now securable at 50 cents per 1000 cubic feet.

Latest Mining and Metallurgical Patents.

Patents Issued Feb. 13, 1900.

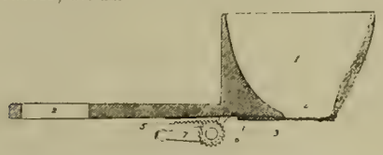
Specially Reported for the MINING AND SCIENTIFIC PRESS.

PROCESS OF CALCINING.—No. 642,602; J. Godfrey and H. J. Hayes, Swansea, England.



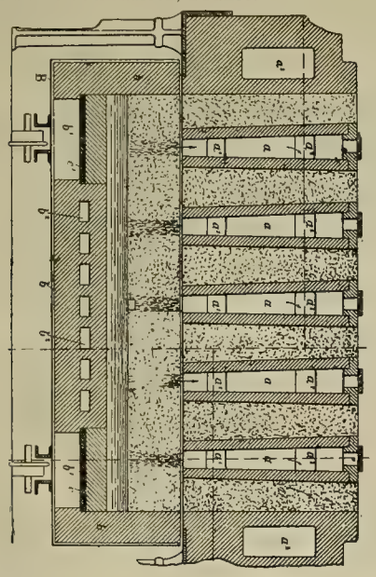
A process of calcining consisting in alternately heating material to be calcined in a closed furnace and exposing it while being stirred to oxidizing effects of atomsphere in open air, out of contact with products of combustion.

FLUX FEEDING DEVICE.—No. 642,931; C. W. Sleeper, Lancaster, N. H.



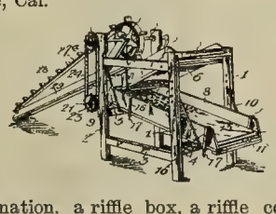
The combination in a flux feeding device, of box to hold flux, of slide arranged to rest upon the bottom of box and pass freely through a slot in side of box, and means for imparting reciprocating motion to slide; the side of the box being serrated with deep recesses to allow flux to fall in front of slide while slide is held down by points between serrations.

ELECTRIC FURNACE.—No. 643,254; A. J. Petersson, Notre Dame de Briancon, France.



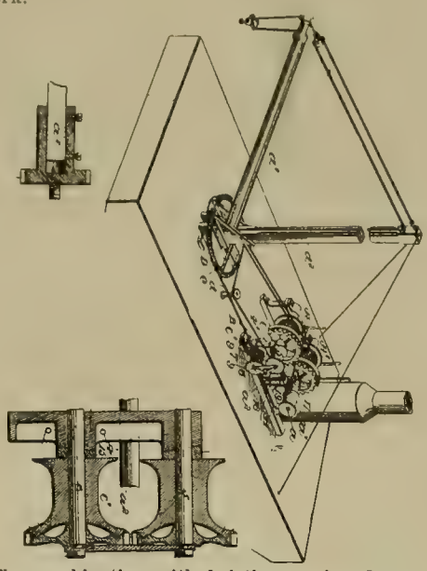
In an electric oven, two superposed chambers of which lowermost is movable and uppermost fixed, fixed chamber adapted to receive and feed material to be reduced and movable chamber having a hearth adapted to receive reduced material, in combination with two electrodes of relatively large area and arranged in a horizontal position in hearth, upper surfaces of electrodes being level with hearth.

GOLD WASHING MACHINE.—No. 643,233; F. C. Pinnell, Lodge, Cal.



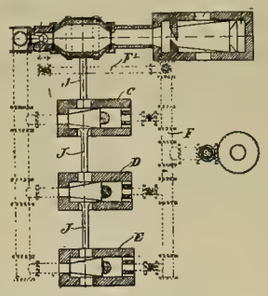
In combination, a riffle box, a riffle consisting of plate, transverse strips secured thereto, metal cap secured to each strip and projecting beyond sides forming pockets, longitudinal rails provided on top of strips, screen having a series of concavities with perforations formed therein, U-shaped clamps each having a cam lever journaled in one end thereof, clamps being arranged to have cam levers operate against bottom of box drawing opposite ends downward to clamp screen and riffle plate.

HOISTING MACHINE.—No. 643,516; S. Mattson, New York.



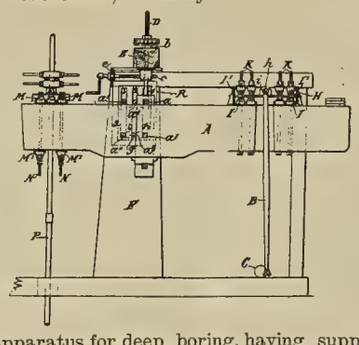
The combination with hoisting engine, drum and shaft therefor, and a gear pinion on shaft, of supplemental frame having non-rotary shafts projecting, paralleling first mentioned shaft, gear wheels loose on non-rotary shafts, meshing with gear pinion, drums loose on non-rotary shafts capable of frictional contact with gear wheels, cams on non-rotary shafts for binding drums against gear wheels, and connections between cams.

PROCESS OF SMELTING AURIFEROUS ANTIMONY ORES.—No. 643,301; C. C. Longridge, Leigh, and G. T. Holloway, London, England.



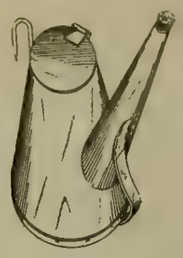
A process for extraction of gold from auriferous antimony sulphide ores consisting in fusion of metallic antimony with ore and addition of sufficient metallic iron to fused ore to convert enough antimony sulphide to metallic antimony to make good the loss of metallic antimony due to the solvent action of the sulphide ore and in the intimate admixture of metallic antimony and sulphide of antimony by mechanical means, to effect extraction of gold by virtue of greater affinity of metallic antimony than antimony sulphide for gold and by greater density of antimony gold alloy produced.

APPARATUS FOR DEEP BORING.—No. 643,428; J. Vogt, Niederbruck, Germany.



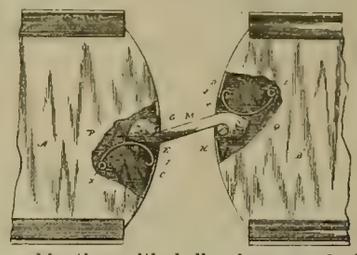
An apparatus for deep boring, having supporting frame with horizontal grooves, rocking beam supported in frame, boring rod suspended from one arm of beam to receive boring tool, and operating means coupled to opposite end of beam, two trunnions for beam, movable along same in horizontal grooves in frame, and a screw for shifting trunnions along frame, whereby the fulcrum of beam is adapted to be shifted without moving beam either longitudinally or vertically.

PIT OR MINING LAMP.—No. 643,281; R. C. West, Rostraver, Pa.



A miner's lamp provided with a protector which consists of a strip of spring metal secured to bottom of lamp passed around the rim at front thereof and secured to lower portion of spout.

CAR COUPLING FOR MINES.—No. 643,504; H. Hughes, Brazil, Ind.



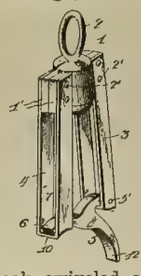
The combination with hollow bumper of mine car provided with curved outer end having a central opening therein at extreme outer part of curve, of fixed coupling pin inside bumper and close to one side of opening, a semi-circular curved spring secured its inner end inside bumper, main curved body of spring projecting across opening, and backwardly curved outer end resting at edge of opening opposite fixed pin, a link consisting of main body, oppositely turned hooks to engage pins, and wedge-shaped cam ends, with sides curved on curvature of spring.

MINE TROLLEY HANGER.—No. 643,327; G. E. Jamme, Pittsburg, Pa.



The herein described trolley hanger for mines, comprising, in combination, a tube having split upper end, a tapered plug expanding tube and securing it in place, a shell attached to lower end of tube, an insulating material secured in shell, and a means embedded in insulating material for attaching thereto the clip which suspends trolley wire.

LOCKING HOOK FOR MINERS' BUCKETS.—No. 643,534; L. J. Richmond, Carthage, Mo.



In safety bail hook, swiveled socket formed with diverging arms, a latch fulcrumed in one arm and having free end adapted to engage opposite arm to lock it with reference to latch arm.

If steel be cooled gradually from the solidification point, it will be noticed that the fall of temperature is at first regular; at a certain point the cooling ceases, and the metal for a time either remains at a constant heat or even shows an increase in temperature; below this point the metal cools regularly as before. This point where cooling is interrupted marks the temperature at which steel changes from the amorphous and plastic condition, in which it can be forged and welded, into the crystalline structure which it retains when cold. It marks the temperature at which the best results can be produced by quenching, and it marks, also, the temperature to be attained (and very slightly exceeded) in annealing.

Masonry Dams and Retaining Walls.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE T. PARDOE.

The author cannot lay claim to being the first to propose the method, but he thinks he can explain the method to mining engineers with advantage, he having noticed that most mining journals in describing works are rather apt to take the scientific knowledge of the designer, and also their readers, for granted, and do not, therefore, give any clue as to the principles adopted in the design.

The system consists in dividing the entire height of the dam into a suitable number of sections (by supposititious horizontal joints), and calculating the weights and properties of each section first separately and then in conjunction with those above it, starting from the top and assuming a thickness of joint in the first instance.

Should calculation show that the center of resistance falls outside the "middle third" at any joint a slice is added to the outer face, and if the required slice is large a new calculation is desirable. The same process is followed if the line of resistance when the reservoir is empty, or, in other words, the line of the center of gravity is too near the inner face. In that case a slice is added to the inner surface.

We will assume that the dam is to be divided vertically into ten sections, each being therefore 5 feet high.

NOTE.—The number of sections here given are fairly large. In actual practise it is desirable to divide the height into a few sections, say four, and calculate the profile approximately, and making a drawing of such profile roughly and to scale it will then be easier to calculate the profile with a large number of sections. The principal advantage of a large number of sections is that it gives a profile approximating more closely to a curve.

Taking the top width at 9 feet, a preliminary calculation shows that the upper two sections may be a rectangular block and still be within the limits of stability.

SECTIONS I AND II.

Weight of masonry = $9 \times 10 \times 165 = 14850$ lbs.

Total water thrust = $62.5 \times 8 \times 10 = 5000$ lbs.

Tangent of angle of deviation of resultant from vertical = $\frac{5000}{14850} = 0.336$.

Weight of center of pressure = $\frac{13}{3} = 4.3$ feet.

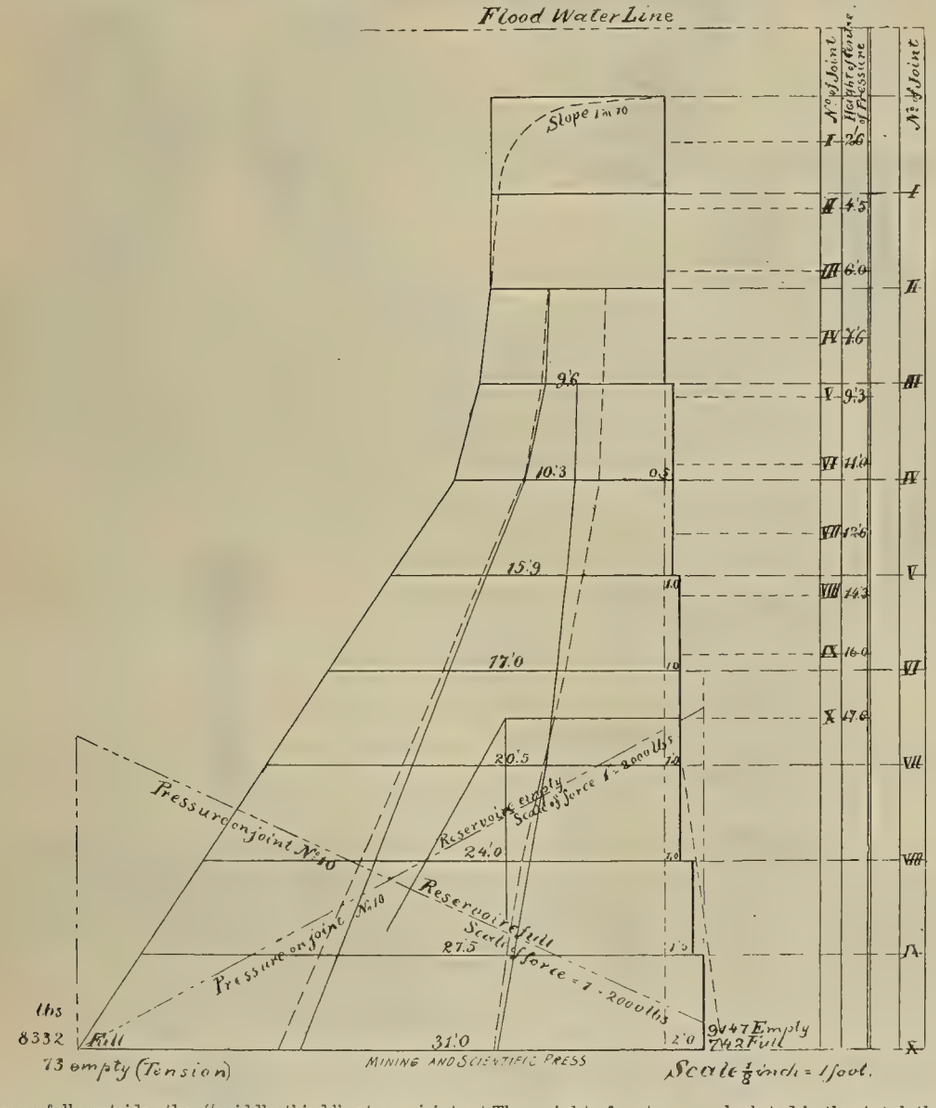
Deviation on joint II from C. of G. = $4.3 \times 0.336 = 1.4$ feet.

Distance of C. of Res. from inner face = $4.5 + 1.4 = 5.9$ feet.

Distance from inner face of outer limit of middle third = $4.5 + \frac{9}{6} = 6$ feet.

NOTE.—As to water thrust. A simple method of calculating this is as follows:

Imagine that the face of the wall can be turned on an axis parallel to its breadth and coinciding with the C. of G. of the plane exposed to the water pressure in this case = half the height of the wall, not half the depth of the water. Turn the face about its axis and calculate the weight of water contained in a box of the same shape of bottom as the plane of the face of the wall and of a height = the depth of water from the surface to the axis round which the face has been turned and of a length = to the height of the wall.



The weight of water so calculated is the total thrust on the wall.

SECTION III.

Height of C. of P. = $\frac{18}{3} = 6$ feet.

Total water thrust = $62.5 \times 10.5 \times 15 = 9843$ lbs.

Top thickness = 9 feet; bottom thickness = 9.5 feet.

Distance of center of G. from inner face = $\frac{1}{3}\left(9 + 9.5 - \frac{9 \times 9.5}{9 + 9.5}\right) = 4.5$ (nearly).

Total weight of I, II and III sections = 33618 lbs.

Tangent of angle of resultant = $\frac{9843}{33618} = 0.292$.

Deviation of resultant from C. of G. = $6.0 \times 0.292 = 1.7$ feet.

Distance of C. of Res. from inner face = $1.7 + 4.5 = 6.2$ feet.

Distance of outer limit of middle third = $\frac{9.5}{6} + 4.7 = 6.2$ feet.

SECTION IV.

Height of C. of $P_1 = \frac{23}{3} = 7.6$ feet.

Water thrust = $62.5 \times 11.5 \times 20 = 14375$.

A preliminary calculation shows that in this solution, if the inner face is vertical and in line with that above it, it will be necessary to considerably increase the batter, and having regard to the large increase in the volume of masonry that this would involve in the sections below it is undesirable to allow the batter to increase too rapidly. We will therefore increase the batter to 1 foot in 5 feet and add a rectangular strip to the inside face, this being a step towards the inside of 6 inches and carrying the C. of G. that much towards the inner face.

We have therefore the following values:

Top thickness 10 feet; bottom thickness 11 feet.

C. of G. from inside face = $\frac{1}{3}\left(10 + 11 - \frac{10 \times 11}{10 + 11}\right) =$ 5.3 feet.

C. of G. from inside face of sections above = $5.3 - 0.5 = 4.8$ feet.

Weight of section IV = 8662 lbs.; total weight = 42280 lbs.

Tangent of angle of resultant = $\frac{14375}{42280} = 0.339$.

Deviation of C. of Res. on joint = $0.339 \times 7.6 = 2.5$ feet.

Distance between centers of G. = $4.8 - 4.5 = 0.3$ feet.

Distance of common C. of G. from inside face = $5.3 - \left(\frac{33618}{42280} \times 0.3\right) = 5.1$ feet.

Distance of center of Res. from inside face = $5.1 + 2.5 = 7.6$ feet.

Outer limit of middle third = $5.5 + \frac{11}{6} = 7.3$ feet.

Inner limit of middle third = $5.5 - \frac{11}{6} = 3.7$ feet.

This calculation shows that the line of resistance falls slightly outside the middle third, but as the error is only slight it may be corrected by adding a wedge-shaped slice to the outer face, making the base of No. IV section 11.3 feet instead of 11 feet wide.

NOTE.—Common C. of G. It is obvious that having calculated the horizontal position of the C. of G. of any one section the center of G. common both to it and to the sections above will be at some point between the two, the distance between being divided in inverse ratio to the weights. For example: Two weights of 9 lbs. and 1 lb. weight respectively at the extremities of a weightless bar 10 feet long. The C. of G. will be 1 foot from the 9-lb. weight and 9 feet from the 1-lb. weight.

It will be seen that the new section whose C. of G. is farthest from the inside face of the dam is of less weight than the combined sections above it, and consequently the C. C. of G. is nearer the inner face than the new C. of G. by the proportionate distance along the bar represented by the distance between the centers of G.

Thus if W = the greatest weight (= sections above) and W_1 = smaller weight (= new section) the distance of whose C. of G. from the inside face = D, and the space between the two centers of G. = S, then C. C. of G. = $D - \left(\frac{W}{W + W_1} \times S\right)$

The author offers no apology for dealing with such simple matters as this, since he believes that many men (in hot countries especially) grow rusty as regards knowledge outside their immediate work, and that such busy men require to have information given in the simplest and most easily digestible form.

(TO BE CONTINUED.)

Table Showing the Relative Volumes of Compressed Air at Various Pressures.

Gauge Pressure Pounds.	Volume of Free Air Corresponding to 1 Cubic Foot of Air at Given Pressure.	Corresponding Volume of 1 Cubic Foot of Free Air at Given Pressure.
0	1.00	1.00
1	1.068	.9356
2	1.136	.8802
3	1.204	.8305
4	1.273	.7861
5	1.34	.7462
10	1.68	.5951
15	2.02	.4949
20	2.36	.4236
25	2.7	.3703
30	3.04	.3268
35	3.38	.2957
40	3.72	.2687
45	4.06	.2462
50	4.40	.2272
55	4.74	.2109
60	5.08	.1967
65	5.42	.1844
70	5.762	.1735
75	6.102	.1638
80	6.442	.1550
85	6.782	.1474
90	7.122	.1404
95	7.462	.1340
100	7.802	.1281
110	8.483	.1178
120	9.170	.1090
130	9.843	.1016
140	10.52	.0850
150	11.20	.0892
160	11 88	.0841
170	12.56	.0796
180	13.24	.0755
190	13.92	.0712
200	14.60	.0684

MINING SUMMARY.

ALASKA.

The Secretary of the Interior has confirmed the decision rendered by the Commissioner of the General Land Office in which it was held that the tide lands of Alaska are not public lands belonging to the United States, within the meaning of the mining laws, and that no rights whatever with respect to such lands shall be acquired by exploration, occupation, location or otherwise under the mining laws.

ARIZONA.

GILA COUNTY.

J. J. Cramer has sold one-half interest in the Ohio Boy group of copper mines, of which he has been appointed foreman and Gen. Mgr.

Chittenden & Ladd of Washington, D. C., are opening up properties near Queen creek and are crosscutting ledges on their Antilles group, near the Buttes, twelve miles from Florence.

Silver Belt: J. A. Fleming, Pres. Black Warrior Copper Co., Amalgamated, has returned from Philadelphia, where he accomplished the amalgamation of the Black Warrior and Donnellan Copper Cos., the holdings of the amalgamated company in this district numbering seventy-five claims. The trial run of the Black Warrior leaching works and furnace has demonstrated the success of the method of reduction and its adaptability to the Black Warrior ores. The entire works have been put under cover. New acid pumps have been put in, and the tanks and launders are being lined with lead. Two tanks, 20 feet in diameter at bottom, for slimes, are being added. The deficiency of water supply is to be overcome by a pumping plant at Pinal creek, two miles north of Globe, and at Russell gulch. There will be thirteen miles of 8, 6, 4 and 3 inch pipe. A 200-ton concentrator and acid works will be built. The sulphide ores for making acids will be furnished from the Diamond H mines. It is expected that the present works will be running and turning out copper within six weeks.——At the United Globe mines the work of sinking the Hoosier shaft from the eighth to the ninth level is going on. The new pump of 1,500,000 gallons capacity will not be installed until the ninth level is reached, and not then unless a greater flow of water is encountered. The Hoosier mine is looking well in all the lower levels. In the Gray mine a drift is being driven to connect with the Hoosier at the sixth level.

GRAHAM COUNTY.

Guardian: Development work is being done in the May Flower district, near Duncan. The ore appears to be in large bodies and runs in copper.

YAVAPAI COUNTY.

J. L. Fisher of Prescott is making application for patent to the smallest mining claim on record in Arizona, embracing only .737 acre.

Counsel for minority stockholders of the United Verde Copper Co. say that the company's property on Jan. 9 will be disregarded and that they will try to have sale set aside and a receiver appointed.

Supt. Haggott is running the Henrietta 10-stamp mill on ore from the Henrietta mine.

Mr. Underhill, in charge of the Big Bug onyx properties at Mayer, has returned from London and Glasgow.

Courier: The Jordan and Campbell claims near Jerome have been sold to the Verde Queen Copper Co. of Arizona, D. P. Bosworth Pres.——The Val Verde smelter, on the Agua Fria, is completed and will begin operations March 1.——Supt. Blauvelt says at the Cash mine the workings are down over 100 feet.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—The Zeila mine, at Jackson, is one of the oldest producers in the county, incorporated in 1873 and a dividend payer since 1880. It is on the east belt. The shaft is 1506 feet deep; 1350 is the lowest level from which ore has been extracted. The ore averages $3 per ton; the sulphurets run as high as 2½%; most of the value is obtained from them. They are treated at the company's chlorination works near by. The forty stamps in the mill are run by water under 150 feet pressure, the water being caught up after doing service at the Argonaut mine, which is under the same management. The hoist is run by steam. Attached to the mill is a sulphuret-saving plant with forty-two tables, run by Messrs. G. G. Gates and A. M. Hambric, who pay a royalty for the slimes. Mr. Hambric has charge of the sulphuret-saver. W. F. Detert is Gen. Mgr., B. F. Taylor chief engineer.

The Amador Queen No. 1 is the property of the Jackson Exploration & Development Co., Ltd., of London, and numbers among its stockholders many prominent English gentlemen. The Supt. is Jas. E. Dye, who took charge of the property in 1889. At present operations are limited to development work. Drifts are being driven north and south on the 1200 level, and sinking is still going on. The ore is low grade, similar to that in the Zeila. It is expected that sufficiently rich ore shoots will be encountered to warrant starting the 60-stamp mill, which has been idle for some months. Both mill and hoist are run by water. The water wheel for the hoist is 200 feet or more below the collar of the shaft, the power being transmitted therefrom by Manila rope. S. T. Smallfield is foreman at the mine; J. E. Dye, Jr., and E. C. Brown, engineers; R. Jones, assayer.

The Amador Queen No. 2 is on the opposite side of the creek from No. 1. The two claims were formerly under the same management, but are now separate properties. As at No. 1, work is at present for the purpose of development, and the 20-stamp mill is idle. A tunnel 1000 feet long has been driven into the side hill, and at intersection with the ledge a station was cut out. In a drift 760 feet from this point a shaft has been started, which will be sunk 200 feet before crosscutting. The hoist is run by water. J. R. Phillips is Supt., V. Van Hall foreman. The stockholders are mainly Toledo, O., people. About twenty men are employed.

The Peerless, with its conjoined claims—the Midway, Osborne and Excelsior—is one of the most recent locations near Jackson to receive attention at the hands of developers. These claims are supposed to be on the main lode, with the Gwin on the south, the Argonaut, Kennedy, etc., on the north. A steam hoist is in operation. The shaft has two compartments, 4x5 feet each, with 8-inch centerbrace, and is being timbered with pieces 12x12 inches, under the superintendence of Henry Osborne.

The Argonaut is the first active property north from Jackson. It adjoins the Kennedy on the south, the hoisting works of the two mines being close to the boundary line between the two properties, and the underground workings running into each other. The Argonaut shaft has three compartments and is 1700 feet deep, at an angle of 62°—the average incline of the vein. The shaft was started in the foot wall, but at 1400 feet cut across the vein, which again came into the shaft at 1700 feet. The mine has a 200 H. P. hoist, run by water, 500 feet down the hill from the shaft, power being transmitted by wire cable. A 40-stamp mill, run by water, is close by. W. F. Detert is Mgr. and principal stockholder; B. F. Taylor, also part owner, chief engineer; J. B. Francis Supt.; L. W. Borger, accountant and metallurgist; Frank Taylor foreman of the mill.

The Kennedy mine is a mile north of Jackson. Since the incorporation of the company in 1886, it has paid about $3,000,000 in dividends. It is still one of the most productive mines in the State. There are two working shafts on the property—the north and the south—600 feet apart, and these are connected at most of the levels. The dump of the south shaft is on lower ground than that of the north shaft, and cars of ore from the former are raised on a hydraulic elevator to be run into the mill on the main track. The machinery at each hoist is run by water, but there are reserve steam plants. The north shaft is 3000 feet deep, corresponding to the 2300-foot (vertical) station. A new vertical shaft is being sunk, 2000 feet east of the present workings. This shaft, 5x14 feet, three-compartment, is now down 1000 feet, and it is calculated will strike the vein at a perpendicular depth of 3500 feet, making it the deepest in the State. Although the rock in the new shaft is tough and hard to break, Supt. Geo. W. C. Glass has been making an average of nearly 90 feet per month, with the use of a single reel hoist. Four power drills are employed, air being taken from a steam compressor on the surface. It is probable a new and large mill will be erected near the new shaft. The present mill of the company is near the old shafts, contains forty stamps and is run by water. Arrangements for saving sulphurets are complete. The Kennedy employs 150 men; W. F. Parks Supt.; Sam'l Pierce mine foreman; Webster Smith mill foreman; E. H. Harrington accountant and metallurgist.

The Oneida mine adjoins the Kennedy on the north. The property includes 2900 feet of lode under mineral patent, and 280 acres of ground under agricultural patent. The Oneida was first worked in the early fifties, belonging successively to U. S. Senator Stewart and James Morgan, and to the Seligman Bros. of New York. The latter parties, in 1896, parted with a one-half interest in the property to the Exploration Co. of London, the purchasers agreeing to put the purchase price into the development of the mine. A new vertical shaft was started 1000 feet east of the croppings, and intersected the vein at a depth of 1892 feet; it is now 200 feet below that point. Sinking has been discontinued, and the work of developing the ore body has been going on for some time. The grading has been completed and contracts let for the necessary machinery for a 60-stamp mill, to be located a short distance from the new hoist. With 6000 tons of ore on the dump, and large quantities blocked out in the mine, the mill will be busy. The hoisting engine at the new shaft is the finest on the Mother Lode, and has been illustrated and described in the MINING AND SCIENTIFIC PRESS. It is a counterpart of the one supplied by the Union Iron Works for the Anaconda copper mine of Butte City, Mont. It is a double direct-acting steam hoist, 20x60 inch cylinders, flat rope reels and capable of hoisting a 7000-pound load at the rate of 2000 feet per minute. Water from the mine is hoisted in an 800-gallon tank. The hoist is provided with steam brakes and steam safety clutches; there are also safety clutches on the cages. At the old shaft, which had been extended to a depth of 1350 feet in early days, work is confined to cleaning it out and retimbering. This has now been done to a depth of 650 feet. A new compound pump will be stationed at the 600 level, whence it will throw to the surface the water brought to that point by smaller pumps from below. Good progress is being made in putting the old shaft in condition. Capt. Thos. Mein, of the Exploration Co., is Gen. Mgr. of the Oneida; John Truscott, Supt.; E. T. Blake, accountant and assayer. About forty men are employed.

The South Eureka mine joins the Oneida mine on the north. The company was organized and ground was broken for the shaft in 1891 and a complete plant put up. The shaft is down 1850 feet, with drifts at 600, 900, 1000, 1200 and 1600 feet, and now being run at the 1800 level. Fine rock is found in the 900 level, near the Central Eureka line. The ore is worked in a 20-stamp mill, now idle. Ordinarily the mill is run by electric power, but this source of energy was interrupted when the works of the Standard Electric Co. were destroyed by fire. The mill can also be run by water, but the supply is not sufficient to run both hoist and mill. The hoist can be run by steam as well as by water, but the early rains cut off the supply of wood for steam purposes. Thus the mill must remain idle until wood can be obtained. The outfit is complete, both in hoist and mill. J. F. Parks of the Kennedy is Supt. of the South Eureka, as well as one of the large stockholders; B. B. Haven, accountant and assayer; Wm. Pollard, foreman. Sixty men are employed when the mill is running.

The Central Eureka joins the South Eureka on the north, one-half mile north of Sutter Creek. Of late this property has come under the control of a company in which the Messrs. Edward and John Coleman, formerly of the Idaho mine, Grass Valley, and Lieut.-Governor J. H. Neff are prominent stockholders. In the development work undertaken since they assumed control, a fine shoot of ore has been encountered at the 1300-foot level. This shoot has remained in the shaft to the present lowest depth—1650 feet. Considerable ore from this shoot was worked with five stamps at the Zeila mill, and yielded $87 per ton. Another shoot exists which yields ore worth $8 to $10 per ton. The management feels encouraged to erect a 10 or 20 stamp mill, and Supt. J. R. Thomas is now in San Francisco making arrangements therefor. The present hoist will be replaced with heavier machinery, and the entire plant will be revised. The hoist is run by water. The new mill will probably be run by electricity. About twenty men are now employed.

At the Baliol mine, east of Sutter Creek, on the old Marre ranch of 230 acres, the present working shaft is one-fourth mile from the mill. There are five parallel ledges in Baliol ground, on one of which the present shaft is down 450 feet; sinking continues. Ore to supply the 40-stamp mill was taken out of open cuts from the different ledges, as well as from tunnels and from the 200 and 300 levels of the shaft. The main ledge is 40 feet wide in many places, and as a low-grade proposition could all be worked. Exploration is now going on, however, to develop high-grade shoots or chimneys, and the mill is temporarily idle. The mill, erected in 1896-97, is equipped with forty 1000-pound stamps, sixteen concentrators, etc., and is run by water under a head of 452 feet, or 200 pounds pressure to the square inch. A 75 H. P. air compressor, also run by water, and controlled by an automatic regulator, sends air to the hoisting works, where from the receiver it is taken into a set of old steam boilers and re-heated before being used in the 30 H. P. hoisting engine and in the power drills in the mine. The shaft is double compartment and well timbered. Buckets are used, but the headgear is equipped with a cage to assist in an automatic dumping arrangement. Besides developing the various levels from the shaft, the company is also developing a vein which it was intended to follow in the old Marre tunnel. The projectors of this tunnel missed the vein. Recently Supt. Porter started a crosscut east from the face of the tunnel. Within 2 feet the vein was struck, at a point where a rich shoot existed. A winze has been sunk 25 to 30 feet on this shoot, in a 10-foot vein, and it holds good, thus giving promise of being one of the most valuable parts of the property. S. R. Porter is manager of the Baliol and of the Mutual, both near Sutter Creek; J. E. Dickieson, accountant; J. B. Weston, foreman of Baliol mill; A. C. Morehead, foreman of mine.

Sutter Creek, Feb. 20.

BUTTE COUNTY.

The Bloomer Hill M. Co. of San Francisco has finished a ditch eleven miles long carrying water from Berry creek to the quartz mine. Next month the company proposes to put in a 40-stamp mill. The ore runs from $2 to $8 per ton.

CALAVERAS COUNTY.

Record: The Lost Log mine, near Milton, is working steadily, the shaft being 240 feet deep on a 30-foot vein of good ore. Six men are at work.

CONTRA COSTA COUNTY.

A smelter is projected at Bull Point, near Martinez, by French capital, the plant to include a modern refinery for the handling of base ores.

EL DORADO COUNTY.

A 20-stamp mill is being put up at the Union mine, Placerville.

LASSEN COUNTY.

B. Talbot has driven a tunnel 100 feet on a ledge varying from 20 inches to 3 feet in thickness. Arrangements have been made for a 5-stamp mill as soon as the machinery can be brought over Diamond mountain to the Plumas side.

MARIPOSA COUNTY.

The Tendron mine of Whitlocks has closed down.

NEVADA COUNTY.

The Grass Valley Exploration Co. has filed three suits in the U. S. Circuit Court against the Pennsylvania Con. M. Co., owner of adjoining property. Plaintiff alleges that the defendant has infringed on the property of the plaintiff and asks $100,000 damages.

Grass Valley reports that the Red Ledge mine is employing fifteen men and that the mill started Feb. 17.

PLACER COUNTY.

The Esperanza mine, Garden Valley district, will resume operations, Robert Harrop Supt.

The machinery has been taken out of the Hathaway mill. Supt. A. B. Eastwood has returned from San Francisco, where he had gone for new machinery.

Sentinel: Work will be resumed in the Golden West mine, owned by R. H. Lloyd of San Francisco. J. B. Knapp has charge of the property. The work will be contracted. This mine is five miles south of Blue Canyon.

PLUMAS COUNTY.

(Special Correspondence).—Scarcely any snow lies at the Diadem mine at an altitude of 4750 feet, and but little on the high mountains in sight. Precipitation there for the season, 51 inches, or about two-thirds of the average for a whole season.

Meadow Valley, Feb. 21.

The Yankee Hill mine, near La Porte, under management of D. La Plante, has closed down.

Eight stamps at the Cresent mill are being run, mainly on custom ore from the Empire mine.

Independent: The De Long M. Co. have an elevator in operation at the Marietta mine. it raises the gravel 37 feet through heavy iron pipe. A 2½-inch nozzle, under pressure of 150 feet, moves the gravel, boulders being moved by a derrick. Eighteen men are employed.——C. D. Hazzard and M. A. Delano of San Francisco have been examining the Plumas Imperial and North Fork mines, near Quincy.

RIVERSIDE COUNTY.

The Star Wano M. Co. has been incorporated at Corona, capital stock $250,000.

SAN DIEGO COUNTY.

The Barona Copper Mining and Smelting Co. has incorporated, capital stock $500,000, to develop copper at San Vicinte.

The San Juan Tin M. & S. Co.'s mines at San Vicente has incorporated, capital stock $1,000,000.

SISKIYOU COUNTY.

The Siskiyou G. & C. M. Co., J. W. Martin Mgr., is arranging to start up in March

and is considering the building of a water jacket smelter.

A Postlethwaite dredger is building on Yreka creek and expected to be running in sixty days.

TUOLUMNE COUNTY.

(Special Correspondence).—The Tuolumne mine is owned in Soulsbyville. The last ore milled from the mine paid $125 per ton; sulphurets assay $300 per ton.

The Wheel Perrin mine is idle. Ore from this mine has paid $60 in free gold; the sulphurets are high grade. They have a hoisting and pumping plant on the mine.

The Soulsby mine is expected to resume. It is in granite formation, has yielded considerable and, with capital and good management, can be brought to the front.

Soulsbyville, Feb. 20.

Independent: The Sunrise mine at Pine Log will be started up under new management.——The Bonanza shaft has been unwatered.

Mother Lode: All the mines near Tuttletown are working steadily. —— The Shawmut mine has nearly 200 men on its payroll.——The Calico mine of Stent has been incorporated and will be worked on a large scale. The flow of water is large in this mine.——The machinery for the 60-stamp mill of the Harvard mine is arriving. The battery blocks are being placed. ——At the Rhode Island mine, Groveland, a three-compartment shaft is down about 100 feet, operating with a two-horse whim. Hoisting machinery will be in operation in about six weeks. S. Carlin is Mgr.

COLORADO.

ARAPAHOE COUNTY.

The Emanuel Fuse Works will build a $100,000 plant in Denver, to be completed within three months.

EL PASO COUNTY.

The Colorado-Philadelphia Reduction Works will build at Colorado City a new chlorination mill at a site to be later determined.

Colorado Springs men will buy the Great Western kieselgore mine, Carlin, Nevada, and erect a plant in Colorado Springs for the manufacture of giant powder, nitro-glycerine and other substances; consideration $50,000. The mineral is used in the manufacture of giant powder, nitro-glycerine and as a plastic for covering steam and hot water pipes. It is also a substitute for asbestos and is employed in the construction of battle ships and large sailing vessels.

Mining Record: Ninety thousand dollars cash has been offered for the Favorite claim on Bull hill and the offer has been accepted on condition that the stockholders ratify the sale.

Mining Record: The Colorado Springs Mining Stock Exchange will contribute $1500 toward a fund to have quotations of 100 stocks represented on that board posted daily on the grounds of the Paris Exposition.

LAKE COUNTY.

The mining rights under the Union smelter plant, Leadville, have been acquired by the Maple Street M. & M. Co., newly organized with capitalization of $1,250,000. A shaft or diamond drill hole will be sunk.

The old Silver Cord mine, of which A. A. Blow, now in South Africa, was manager, is to be worked through the Yak tunnel.

Post: The Maid and Henriett, Leadville, is now worked almost entirely by lessees.

PARK COUNTY.

The Fairplay placer, Fairplay, has been sold to Cincinnati men, who will equip it on an extensive plan under the management of T. R. Miller.

PITKIN COUNTY.

Aspen Tribune: Despite the increase in milling capacity of 400 tons per day in Cripple Creek district, an increase at Leadville of 350 tons per day, besides the blowing in of nearly all idle smelting plants in the State, the production will exceed the combined smelting and milling capacity by over 1000 tons per day before the end of the year. To meet this is figured an increase in the pyritic smelter from 350 to 1000 tons per day. This will relieve the lead smelters of a large sulphide ore tonnage. The 500-ton Dorsheimer-Joralman smelter and a possibility of the 300-ton Rocky Mountain smelter at Florence being built, with the 350-ton mill now in course of construction at Florence, and the increased capacity of the Metallic Extraction Co.'s plant and of the Woods 350-ton mill, will give producers relief in the latter part of the year.

SAGUACHE COUNTY.

The Parkhill Smelting Co. has incorporated in Denver, capital stock $2,500,000, to acquire by purchase and operate the smelting and refining works of the New York Smelting Co. at Parkhill; incorporators, D. G. Weems, G. W. Hoyt, T. H. Baldwin.

SAN JUAN COUNTY.

Dr. P. M. Pascoe proposes to build a pyritic smelter at Silverton.

SAN MIGUEL COUNTY.

The new cyanide plant at Pandora is in operation. It is a 100-ton plant for the tailings strung along the river below the Pandora mill.

The Carribeau mine, near Ophir, is reported sold to the Venture corporation for $350,000.

Examiner: The Tomboy at Telluride is making improvements at mine and mill. ——The Japan will enlarge its milling capacity, increase its output and open additional ground. It is located near the Tomboy. —— The Special Sessions and twenty others in the district will be worked this season.

SUMMIT COUNTY.

Breckinridge reports that three of the four dredgers owned by the North American Gold Dredging Co. at that place are to be removed to other points, not because of failure but the result of changes in management. One dredger will be operated at Breckinridge next summer.

TELLER COUNTY.

Spencer Penrose, C. L. Tult and C. M. MacNeill project a new $750,000 mill for the Cripple Creek district, to be probably located at Canyon City.

W. S. Stratton has bought the Favorite on Bull hill, adjoining the Logan and American Eagle, on a basis of $115,000.

IDAHO.

IDAHO COUNTY.

Review: The Big Buffalo group of Buffalo Hump the past season sunk a 70-foot shaft and drifted 135 feet on the vein. The ore body in the bottom is not of any higher grade than that encountered on the surface. A crosscut from the face of the drifts discloses nearly 40 feet of solid ore. A sample selected by mining men shows a value of the ore body of $15.90 per ton in gold. Seven feet of ore on the hanging wall averages $40 per ton in gold. Half of this property is owned by the original locators and the other half by Clark & Sweeny of Spokane.

NEZ PERCES COUNTY.

A smelter at Lewiston is projected.

OWYHEE COUNTY.

About ninety men are employed on the Black Jack mine, and it is running as vigorously as before the shut-down last summer.

The South Oro Fino mine, on War Eagle, formerly known as the Golden Chariot, has been sold to the War Eagle Con. M. Co., the bond being taken up and the money paid over.

MICHIGAN.

HOUGHTON COUNTY.

A 4-head stamp mill is to be built for the Baltic mine, to cost $60,000.

A new hoisting plant will be installed at No. 4 shaft, Atlantic mine.

MONTANA.

CLARKE COUNTY.

Independent: F. Harrington, of Butte, bonded the Majestic group, an extension of the Boss Tweed and Clipper groups, between them and the Leviathan group at Mammoth.——The pumps in the Waterlode mine at Red Bluff have been pulled and the work suspended.—— Work has been suspended at the property of the High Ore Gold & Copper M. Co.

DEER LODGE COUNTY.

M. Daly has bought the French gulch placers, near Anaconda, and will have several large dredgers built for their operation.

Standard: An important mine of the Anaconda Co. is the Mountain Consolidated. The mine is worked through two shafts; the first is down 2000 feet and the second has reached a depth of 1600 feet, making the mine the deepest in the district, with the exception of the Green Mountain. At No. 1 shaft is the great upright engine built by the Union Iron Works of San Francisco, and known as the Aztec. It is the companion of the Modoc, at the Never Sweat, of about 2700 H. P. At this mine the gallows-frame is of timber, and the hoisting is done with four-deck cages—four cars of ore being hoisted at a time. It is raised and dumped through a chute into a bin 40 feet below. Here it is loaded into horse cars, which approach the bin through a tunnel, and taken to the main railroad dump, about 250 or 300 feet. At this mine are two air compressors. The boiler plant consists of eight sets, aggregating 1000 H. P. At shaft No. 2 is nothing but a hoist. The engine is double-acting, of about 500 H. P. The hoisting is done with double-deck cages and steam is furnished by the boiler plant at the main shaft. The timber framing is also done there, the finished timbers being sent down by a compressed air tram. At this mine an immense quantity of timber is used. For January it is estimated at 450,000 feet. The mine is yielding largely—an average of about 750 tons per day. Six hundred men are employed. J. Keegan is Supt.

FLATHEAD COUNTY.

The concentrator at the Snowshoe, near Libby, starts April 1. About eighty men will be employed.

LEWIS AND CLARKE COUNTY.

The Drum Lummon mine at Marysville produces more money in a year than any agricultural county in the Mississippi valley.

A 40-stamp mill will be built at the mines owned by L. S. Woodbury of Great Falls at York.

NEVADA.

ELKO COUNTY.

Work will be resumed in the Tuscarora Chief, at Tuscarora. There are 10,000 tons of tailings of an average value of $8 in gold.

WASHOE COUNTY.

Silver State: The Reno Reduction Works have been started up again.

WHITE PINE COUNTY.

News: W. B. Lawler of Oregon, who has been investigating Cherry Creek mines, has bought the Watson Bros. group and put three shifts on.——I. Quinn, foreman Star mill, reports the mill running with plenty of ore.—— The American Victor mine, which was bought by Salt Lake men about a year ago and abandoned, is being developed by the original owners, who have shipped a consignment of ore which netted $150 a ton.——W. S. Brown, of Salt Lake, has been investigating mining properties at Cherry Creek. Mr. Brown owns mining interests in Tuscarora, Mercur and Bingham.

NEW MEXICO.

COLFAX COUNTY.

New Mexican: The Confidence properties in the Elizabethtown district are being developed.——J. B. Wheeler, of Colorado Springs, will overhaul the mill at Baldy this spring and start work on the Moale and French Henry.——The Black Horse mine at Elizabethtown has the longest tunnel and the deepest shaft in the Elizabethtown district. The tunnel is in 1700 feet, and the shaft is down 340 feet.

DONA ANA COUNTY.

New Mexican: The Humphrey-Connor group at Gold camp have been patented. ——A concentrating plant is to be erected on the Oriental in Gold camp.——The Black Prince, at Gold camp, in the Organ mountains, has been bonded to Kansas City men.

GRANT COUNTY.

New Mexican: Hanover is to have a smelter this year.——The smelter at Pinos Altos is being put in shape for resumption of work.——The shaft of the Pacific Gold Co. at Pinos Altos is being sunk to the 800-foot level.

SIERRA COUNTY.

New Mexican: Senator Andrews asks $1,000,000 for the Trippe mine at Andrews. ——A strike of silver ore has been made in the Cabello mountains.——Cleveland parties are examining the manganese iron deposits around Hillsboro.——The Walker M. & M. Co. are making arrangements to put in larger reduction works at Grafton. ——Buchanan & Baker of St. Louis, for the company that owns the El Dorado near Hillsboro, are putting the property in shape for the resumption of operations.

OREGON.

JOSEPHINE COUNTY.

At Grant's Pass, B. E. Meredith, Supt. Wilson placer mine, on the Illinois river, is piping day and night, with a good head of water.

The Big Yank M. & M. Co. is under the management of J. F. Wickham. Fifteen men are employed at the mine.

At the Eureka mine work goes steadily on. They are getting out ore and storing the same until they can pack in a new mill of ten stamps.

At the A. & B. placer mine, Galice creek, the break of 300 feet in the flume, caused by a landslide, has been repaired, and two giants are at work.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Deadwood reports that the Bingham mine is bonded to John Pierce of Sioux City, Ia. It is in the North Lead district.

J. Simmons of Deadwood is appointed assayer for the Colorado & Deadwood M. Co.

Extensive sampling is being done at the Gilt Edge mine, near Deadwood, preparatory to resuming work.

Joseph Underwood, Mgr. Boston & South Dakota M. Co., in the Blacktail district, near Deadwood, says it is decided to put in a cyanide annex at the stamp mill.

It is probable a custom cyanide plant of 100 tons capacity will be built near Deadwood this season. Plans for such a plant are being prepared.

Mining Review: The Star shaft, Homestake mine, has reached a depth of 1130 feet, making it the deepest shaft in the Black Hills.

Times: The rich ore encountered in the Holy Terror mine was in the north drift on the 500-foot level, on the ground that was bought from the Keystone. It is a continuation of the Holy Terror vein.—— A deep shaft is being started on the New Eldorado mine, near Hill City. Dr. Peters of New York has an option on the property and is putting in air compressor and other improved machinery.

UTAH.

EMERY COUNTY.

Mining Review: The Azurite Copper M. Co., operating copper properties in Emery county, arrived at the Taylor & Brunton sampler with their initial car of Azurite ore. The test shipment was better than anticipated, showing 12.5% copper. Development will be pushed as fast as possible, and probably a leaching mill will be built in the spring. The property consists of fifteen claims located along the sand reef within four miles of Green river.

MILLARD COUNTY.

(Special Correspondence).—The Charm mine, thirty miles west of Oasis, has a 320-foot shaft, 700 feet of crosscuts and drifts, 300 feet of winze work, a 150-foot upraise and has a good showing of gold and copper ore.

SALT LAKE COUNTY.

(Special Correspondence).—Bingham district: The Old Jordan & Galena, one of the properties of the U. S. group, has made a fine showing of surface improvements within the past eight months. A machine shop has been equipped and in the engine room a new 100 H. P. compressor is in operation, supplying compressed air for the drills, hoists, pumps, and from which air is conveyed through a 4-inch pipe to the Old Telegraph group, four miles distant, supplying the air drills and pumps at the latter mine. A four-story rooming house, for the employes, eighty rooms, steam-heated, electric-lighted, with bath rooms and other conveniences, has been completed. At the Old Telegraph, also one of the U. S. group, a large rooming house, similar to the one just described, has been built, as well as other buildings that make the surface equipment substantial and complete.

The Shawmut mine, located in Carr fork gulch, a short distance above the town of Bingham, is being developed under the management of Geo. B. Earnshaw, formerly of Montana and California. Present development is through a tunnel, but preparations are being made for putting up hoisting machinery and sinking an incline shaft from the surface, following the dip of the vein. The ores thus far disclosed are sulphides of iron and copper, carrying copper, silver and gold values. Mr. Earnshaw states that a contract is being let to erect a 100-ton concentration mill to run on Shawmut ores. It will be located in the town of Bingham.

The Red Wing has a location on the mountain side, several hundred feet south of the main Bingham canyon and near town. A tunnel cuts westward about 100 feet, crosscutting the ledge of ore trending north and south. The work drifts on the vein some 700 feet northward, following the smooth, sharply-defined hanging wall the entire distance. The first 200 or 300 feet of this drift is in a mineralized gangue that is said to average 8% copper, considerable of which has been shipped to the smelters direct. As the drift has proceeded northward the ledge appears to lose its copper characteristics, but this loss is compensated for by coming into a widening body of galena, running from 30% to 60% in that material, as well as high values in silver. These ores are carried by a black lime gangue. The Red Wing Co. owns a concentration mill several hundred feet from the mine, which is running on Red Wing ores at the rate of sixty tons per day. To indicate the extent of work, it may be stated that the ledge is being worked three sets wide at the north end and the stopes at present extend six sets high. Fred Lewis is foreman.

The Dexter group, in the lower part of town, was opened twenty-eight years ago, and was worked successfully at the time the old Winnemuck smelter was operating. In those days the workings were confined to within 100 to 150 feet of the surface, and the product was rich lead carbonates. Some years ago additional work was done by C. W. Watson and others, who followed the ledge along the hanging wall some 400 feet on an incline, getting into the sulphides. It is estimated the property has produced $500,000 in silver-lead ore. It is now in the hands of J. H. Stallings, J. T. Hudson and G. L. Bemis, who have a bond thereon, and who apparently intend taking up the bond.

Mr. Bemis is in charge. A new hoisting plant has been erected and twenty men are employed. At each 100-foot station, on the 400-foot incline, a drift is run in opposite directions on the ledge, from which it is seen the old workings were kept close to the hanging wall, without any attempt to penetrate the strata toward the foot wall. The plan of the management is to run crosscuts to determine thickness of ore body. Much ore exposed by present workings runs about 50% lead and ten ounces silver and small values in gold. It is expected that production will begin next month. Bemis Bros. own the Dewey mill, in the canyon, which is new and capable of concentrating 150 tons per day, being equipped with crusher, rolls, sizers, jigs and vanners. It is thought it will soon start up on Dixon ore.

The Midland group of seven claims, joining the Fortune grounds, is being opened by a crosscut tunnel, which is now in 800 feet, and which will soon reach the Fortune vein. This group has produced about $150,000 worth of ore, but mainly from surface workings. G. L. Bemis and others are owners of the Midland.

The West Mountain placer property is being operated by Messrs. Watson and others, with Dan Clays in charge.

The Boston Con. M. Co. are sinking a winze from the Phœnix tunnel, 400 feet from the entrance. The work of driving the Armstrong tunnel from the Carr fork side is in progress, as is also similar work in a tunnel on the opposite side of the mountain by the same company.

The Highland Boy mine delivers about 200 tons of ore per day to the ore bins at the R. G. W. R. R. station, a distance of about three miles, by means of an aerial tramway. It is estimated their ores will average 8% copper, besides which there are fair values in gold and silver.

On the Columbia group, belonging to F. B. Cook and associates, three parallel veins exist, there being 500 feet of drifting on one known as the What-cheer. The group embraces fifteen claims and end lines with the Fortune on the north. There is a porphyry displacement near the end lines which changes the regular course of the lodes. The country rock is an altered gray porphyry, highly siliceous, which is lightly mineralized with copper. The veins wave considerably, have a dip of 30° and carry a uniform value of about 2% copper, and from $2 to $3 gold and silver. The drifts follow the hanging wall, no foot wall having been found.

WASCOTT.

Bingham Canyon, Feb. 17.

The old Winnemuck property, a group of eight patented claims, was bought by James Campbell of California. Included is the old mill and hoisting and pumping machinery set up several years ago. The workings are 400 feet deep and it is stated good ore reserves are ready for shipment. Mr. Campbell intends to begin at once to re-equip the mill and bring it up to the standard of a modern concentrator, with 150 tons capacity. He will also prepare to sink deeper and thoroughly open the mine. He states that he has 100,000 tons of ore on various dumps which will bear concentrating. Mr. Campbell was identified with mining in Bingham Canyon twenty-five years ago.

The Bingham Gold & Copper Co., Col. Heffron Mgr., have advanced 1100 feet with their tunnel which is being driven to cut the edge. On the opposite side of the mountain are extensive workings, opened years ago when the mine was known as the Commercial. The old tunnel, on the Commercial side, cuts the ledge at about the line between the oxidized and sulphide ores, and the production in former years was chiefly from the oxidized section. From the old tunnel an incline follows the ledge down over 300 feet, through which much sulphide ore was produced. The workings, in drifts and crosscuts on this side, aggregate 2000 feet. The new tunnel, being driven toward the dip of the vein, and which will soon cut it, is on a level 500 feet below the old tunnel on the Commercial side. It is said the ledge is approximately 200 feet wide, the main pay streak next to the foot wall being 3 to 5 feet wide.

Herald: Plans for the 300-ton pyritic smelter for the Bingham C. & G. M. Co. have been approved, and W. H. Nutting, the designer and constructing engineer, is on his way back from Boston and New York. On his arrival contracts for building will be closed.

Bulletin: Seventy men were discharged at the United States mines this week.

SUMMIT COUNTY.

Review: A new system of ore delivery is at the Ontario and Daly-West mines, at Park City, the long tunnel at the former property being utilized. This tunnel was extended from the Ontario through the Daly into Daly-West ground, and ore from the Ontario and Daly-West is run out a short distance to railroad transportation. A train of twelve cars is drawn by one mule, the intention being to deliver 180 tons of ore at the mouth of the tunnel.

TOOELE COUNTY.

(Special Correspondence).—The Eutonia, thirty miles northwest of Tintic district, is a lead-silver proposition of good promise. The last car of ore hauled from it is said to have run 42% lead, twelve ounces silver and small values gold. It is being opened through an inclined tunnel. The ore is principally galena, but in places it is carbonate.

The Bingham West Dip Tunnel Co. is to be incorporated, its purpose being to drive a tunnel from a point in Pole canyon, on the west side of the Oquirrh range, in a southeasterly direction, cutting under various properties on the Bingham side of the mountain. As projected, the tunnel will be four miles in length, and on a level 2100 feet below the crest of the range. It will cut the formation almost at right angles and will tap the Old Jordan and Galena grounds considerably below their present workings and will be driven on a drainage grade toward Tooele valley, which lies several hundred feet below the mouth of the tunnel. Some twenty claims, owned by men concerned in the enterprise, and located on the west dip of the Oquirrhs, will be acquired by the new company. It is understood also that the promoters are securing the co-operation of various surface owners along the tunnel site as located.

WASCOTT.

Tooele, Feb. 20.

WASHINGTON.

FERRY COUNTY.

The nineteen tanks at the Mountain Lion, Republic camp, contain 90,000 pounds of steel and over 6000 pounds of rivets.

WYOMING.

CARBON COUNTY.

The Newsboy Co. have been putting up buildings for the past month and are now sinking. The ore is mostly bornite and copper glance.

It is reported a smelter for Grand Encampment will be built next summer.

FOREIGN.

AUSTRALIA.

The increase in the gold production of New South Wales for '99, which doubles the output for '98, has no corresponding increase in mining activity, nor in rate of extraction per ton. It is concluded that greater care has governed the compiling of returns, and in the past there has been a failure in this respect. In the Tasmanian total, gold exported in blister copper amounted to 25,000 ounces.

BRITISH COLUMBIA.

Mgr. E. B. Kirby of the War Eagle and Center Star ascribes the shutting down of those mines to inability of equipment to supply ore to smelter and push development simultaneously.

The Commonwealth group, West Kootenay, has been bought by the Canadian Gold Fields Syndicate for $50,000. Mgr. J. C. Drewry says a compressor plant and 150-ton concentrator will be built.

The miners' unions of Sandon, Silverton and New Denver will accept the owners' compromise offer recognizing $3.25 as the standard wages for an eight-hour day instead of $3.50 as heretofore; the strike is off.

KOREA.

By the steamer Coptic last week came from Korea 1840 sacks concentrates to the Selby Smelting Works, San Francisco, from the Sloat Syndicate's mines, the second shipment of the kind.

RUSSIA.

Platinum occurs in the Urals, in the Government of Perm, where it is found on various private properties and State lands. In the mining district of Goroblagadat there are about seventy allotments under platinum exploitation by different private proprietors. Platinum occurs in the form of alluvial deposits, or platinum-bearing sands, which frequently contain gold. These deposits vary in richness from several doli to four or five zolotniks and more in 100 poods of sand. (One zolotnic=96 doli, or 4.2657 grams, or 65.830 grains troy. The Russian pood is equal to 36 pounds English). The thickness of the platinum-bearing deposits is rarely less than 3 and often reaches 7 feet. The grains of platinum are small, but nuggets are frequently found weighing one or more kilograms. As in California the platinum is often accompanied by iridium and osmium. The Ural platinum deposits are the only ones in the world, so far as is at present known; it is worked nowhere else in place and is known only as a mineral finely dissemintated in certain rocks. All the platinum extracted in the Urals is forwarded in the crude state to St. Petersburg, whence it is sent abroad. Although there are two laboratories in the Russian capital for refining platinum ore, the greater part of it is exported in the crude state. The production of platinum is subject to a tax of 3% for leasehold and 4% for freehold works. The yearly profits thus accruing to the Government average from 60,000 to 80,000 roubles. The rapid and variable fluctuations in a price of a product having no definitely fixed exchange value, but which is indispensable to the arts, are reflected upon the production of platinum in Russia. Thus, when the price of the metal is high it is profitable to work the poorer deposits, while it is only possible to work the very richest when the price is low.

The first deposit of platinum in Russia was discovered in 1819, the actual exploitation of this metal commenced in 1824.

From 1828 to 1845 platinum money was coined in Russia. The denominations of these coins were three, six, and twelve roubles. The total value of the platinum money put into circulation was 4,250,000 roubles. During that period the production of platinum increased considerably, but when the coinage was stopped the exploitation of the metal almost entirely ceased, and only revived in 1859. From that time the production has varied with the foreign demand and market price. The production of platinum began 1824 with 2 poods and 1 pound, and in 1825 it had increased to 11 poods, 24 pounds. From 1886 to 1890, the last period for which there are published data, the product was 1033 poods, 6 pounds. The total production of crude platinum from 1824 to 1890 was 6373 poods, or 3,670,968 ounces. A portion of the platinum now produced is obtained as a by-product of gold. In 1890 there were eighty-two platinum deposits under operation, and the total washing of 47,334,100 poods (about 763,453 tons) of sand yielded 173 poods, 26¾ pounds (about 147,980 ounces).

The largest quantity is now extracted from the deposits of Nizhni-Tagilsk, belonging to Prince Demidoff-San Donato, and at the Krestovozdvighensk deposits Count Schouvaloff. There are now about 7000 men actually employed in the exploitation of platinum. Among all foreign countries Great Britain is by fair the largest consumer of Russian platinum, taking on an average about 200 poods yearly. The value of the annual exports of platinum amounts to from 1,200,000 to 1,600,000 roubles.

THE KLONDIKE.

Thawing machines supersede the first slow method of handling the frozen ground, and gravel that goes $2.50 to the cubic yard is now worked at a profit. A "modern" plant on the Yukon comprises boilers, pumps and engines. The material is hoisted from a shaft, and water warmed by steam from the boiler exhaust is used for sluicing.

Commercial Paragraphs.

THE Pelatan-Clerici plant of the Cochiti G. M. Co. will be in charge of E. Walser of Denver, Colo., who is now in Bland, N. M.

F. R. FIELD, Colorado representative Jeffrey Mfg. Co., has returned from Fairfax, Wash., where he installed a power plant of the Northern Electrical Mfg. Co.'s electrical machinery and mining machinery.

THE Sullivan Machinery Co. of Chicago report sales of seven drills and equipment to the Iron Silver M. Co., Leadville, Colo., four drills to the Ajax mine, Victor, Colo., and five drills and equipment to the Kanawha lease, Creede, Colo.

THE Mine & Smelter Supply Co. of Denver, Colo., has shipped twenty Wilfley concentrators to the Anaconda Copper M. Co., Anaconda, Mont., and three 15-ton chlorination barrels, with equipment, for the National Gold Extraction Co., Florence, Colo.

THE John A. Roebling's Sons Co., Trenton, N. J., have completed a large order for the United States Government, amounting to 2200 miles of galvanized Norway iron wire, Nos. 9 and 14 gauge, and weighing 440,000 pounds. This order was entered, started, inspected and shipped inside of ten days, every coil being accepted on rigid examination by the United States inspectors. The shipment was directed to the chief signal officer at Manila and went on the Java, Feb. 5.

Recently Declared Mining Dividends.

Raven G. M. Co., Cripple Creek, Colo., $10,000; payable March 20.

Daly-West, Park City, Utah, $75,000; Feb. 17.

Grand Gulch, Utah, $2400; Feb. 17.

Gold Coin M. & L. Co., Victor, Colo., $20,000; payable Feb. 25.

Consolidated G. M. Co., Victor, Colo., $10,000; payable Feb. 25.

Personal.

T. F. VAN WAGENEN is now at 1508 Fillmore St., Denver, Colo.

W. C. PARSONS of the McCabe mine, Arizona, is in San Francisco.

J. R. PHILLIPS is Supt. Amador Queen No. 2, Jackson, Amador county, Cal.

F. B. JOYCE, Supt. Defender mine, Amador county, Cal., is in San Francisco.

W. J. BATEMAN succeeds N. W. Clayton as Gen. Mgr. Salt Lake & Los Angeles Co.

CAREY W. THOMPSON, Supt. Victor, Jr., G. M. Co., Placer, Or., is in San Francisco.

SUPT. LOGAN of the Old Home mine, Grass Valley, Cal., is in San Francisco on business.

G. B. UNDERHILL, Mgr. Arizona Onyx Co., Mayers, Ariz., has gone to Glasgow, Scotland.

H. A. COHEN is in Shasta county, Cal., arranging for a smelter for the Bully Hill property.

J. TILTON of the Cleveland mine, Grass Valley, Cal., is in San Francisco buying machinery.

JNO. A. KIRBY, former Supt. Bullion-Beck, Utah, goes to the Daly-West, Park City, Utah.

G. W. PORTER, formerly of Cripple Creek, but now of Old Mexico, is visiting Cripple Creek, Colo.

R. R. BOWLES of the Pyritic smelter of Leadville is visiting mine owners at Cripple Creek, Colo.

G. D. WAUGH has been appointed Supt. for the Portland, Clinton and Buxton Co.'s, Deadwood, S. D.

C. W. STICKNEY of Montana has taken charge of the Arizona, Eastern & Montana Smelter, near Mayers, Ariz.

JOHN TEMPLE is succeeded in the superintendency of the Fanny Rawlins mine, at Leadville, Colo., by Mr. Robinson.

W. S. WARD has gone to Paris, where he will have charge of the mining exhibit of the United States at the Exposition.

FRANK A. LEACH, Supt. U. S. Mint, San Francisco, is at Forest Hill divide, Placer Co., Cal., where he has mining interests.

W. C. RALSTON, Pres. California State Miners' Association, left San Francisco for Washington, D. C., on the 22nd inst., to be absent thirty days.

THE visit of J. S. MacArthur to Australia is in the interest of the North Mt. Lyell Co. and to inspect the resources of the west coast of Tasmania.

JOHN HARNAN of the Portland G. M. Co. of Colorado Springs, Colo., has been appointed Gen. Mgr. Colorado & Deadwood M. Co., Deadwood, S. D.

W. C. WYNKOOP, former publisher of the Mining Industry and Review, Denver, Colo., is manager of a mine at Woodbury, N. M., in the Cochiti mining district.

T. H. SIMMONDS has resigned the superintendency of the Empire M. & I. Co., Nevada county, Cal. G. W. Starr has assumed personal management thereof.

P. W. CAMPBELL, Mgr. Gold Crown M. Co. at Newsome, Idaho, and J. A. Hutchinson, Mgr. Trade Dollar, Idaho, have been looking over the mining districts of eastern Oregon.

JOHN F. MCDONNELL, Sec. Virginia City, Nevada, Miners' Union, has been appointed by Governor Sadler a delegate to the International Mining Congress, at Milwaukee next June.

MESSRS. BECKER, BAYHA, DOBBLESTEIN, FORSTNER AND STAHLER of San Francisco are at Sutter Creek, Amador county, Cal., examining the Baliol mine and other properties.

D. G. JEWETT, late Supt. Big Bug Smelting Works, Mayer, Ariz., is now consulting metallurgist for the Boston G. M. & M. Co. and the Venture G. M. & M. Co., Guffey, Park county, Colo.

EDGAR RICKARD left San Francisco on the 21st for Launceston, Tasmania, in the interests of the Venture Corporation, which recently bought the Briseis tin mine for $750,000 cash and the same amount in shares of the new company.

S. C. HIGGINS, Sutter Creek, Amador county, Cal., has returned from Punjom, State of Pahang, in the Malay peninsula. He went out there eighteen months ago in the interest of the Punjom M. Co., whose head office is in Hongkong. He was Supt. of the milling and fitting departments, having been engaged by one of the owners of the mine in San Francisco previous to his departure. He considers the conditions for American mining men favorable in the Malay peninsula. The Government is liberal in its concessions. Returning on the same steamer with Mr. Higgins were two Americans who had gone to the Orient for oil exploration—one in Burmah, the other in Sumatra.

Industrial Notes.

—Ballard, Wash., shingle mills cut in 1899, 411,800,000 pieces.

—Lead ores are being shipped from Guaymas, Mexico, to Germany as blallast.

—The Los Angeles, Cal., Industrial, Mining and Citrus Exposition has begun.

—Dawson reports a strike of coal at Rock Creek, twenty miles from Dawson, up the Klondike.

—The United States is sending builders' hardware to the amount of about $45,000 a month to Mexico.

—The Colorado Fuel & Iron Co. has capital stock $25,000,000, issued and paid $15,000,090, debts $7,260,536.49.

—At Monterey, Mexico, an American syndicate, capital $10,000,000, will construct a steel plant to employ 4000 men.

—At San Francisco last week from the Orient by the steamer Coptic was brought 23,821 pounds of opium; value, with duty paid, $400,000; duty, $142,926.

—In Madison county, Montana, a dam is being constructed in the Madison canyon to secure water power for an electric light and power plant, to be 1000 H. P. and to cost $400,000.

—The Northern Pacific Railway will in March do away with gas as an illuminant and introduce a new system of electric lighting, each car being independently supplied with lighting power from motors on the car axles.

—The Maryland Steel Co. has closed a contract for 5000 tons of steel rails to go to Norway. This is said to be the first shipment to that country from the United States, and is believed to be the entering wedge of a large business.

—According to the specifications of the New York Rapid Transit Commissioners, $5,000,000 of electrical apparatus will be used in construction of the tunnel on basis of present prices. Before the road is in complete operation, expenditures for electrical apparatus will be from $12,000,000 to $13,000,000.

—James Detrick of California is arranging for the purchase of some ten-ton steel wagons and traction engines to draw them, with a view to establishing a freight line across the desert in the northern part of China, to enter active competition for the carrying trade, which is now done wholly by camel caravans.

—The third installment of $25,000 due on the $100,000 bonus to be loaned the Truckee, Cal., General Electric Co. for the construction of the plant at Floriston, Cal., has been paid by the Comstock mining companies. The last payment of $25,000 will not be due until after the plant is in operation and the power delivered on the Comstock lode.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING FEB. 13, 1900.

643,444.—PADDLE WHEEL—J. S. Allison, Portland, Or.

643,449.—RAIL ANCHOR—S. B. Anderson, Hartford, Wash.

643,263.—WHEELED SCRAPER—W. C. Bradford, Arbuckle, Cal.

643,245.—SLIDING DOOR LOCK—J. A. Eastman, Fruitvale, Cal.

643,373.—PARCEL REST—Gabriel & Atkinson, Portland, Or.

643,266.—DISPLAY HOLDER FOR HATS—Sarah E. Griggs, Woodland, Cal.

643,132.—BUGGY TOPS—C. R. Hesseltine, Creston, Wash.

643,269.—PLATE ICE MACHINE—J. C. Kitton, S. F.

643,249.—POTATO DIGGER—W. Kretzer, Baker City, Or.

643,271.—LOOM—J. H. Northrop, Tustin, Cal.

643,233.—GOLD WASHER—F. C. Pinnell, Lodge, Cal.

643,275.—PICTURE—A. N. Polymath, Los Angeles, Cal.

643,306.—CARBURETER—V. J. A. Rey, S. F.

643,608.—WAVE MOTOR—C. F. A. Roell, Los Angeles, Cal.

643,207.—BOILER—E. J. Sabin, Colusa, Cal.

643,543.—GARMLNT—Ella M. Schrader, Seattle, Wash.

643,552.—FRAMING JOINT—C. C. Squires, Seattle, Wash.

643,557.—WAVE MOTOR—S. P. Swearingen, Pasadena, Cal.

643,612.—DOOR CATCH—M. J. Thuestad, S. F.

642,213.—SHOEMAKER'S OUTFIT—H. Waters, Bisbee, Ariz.

642,438.—STOVE—J. E. & J. Wormald, Spokane, Wash.

643,182.—CAR COUPLING—O. Yates, The Dalles, Or.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PLATE ICE MACHINE.—J. C. Kitton, San Francisco, Cal., assignor of one-half to C. C. Hutchinson, Oakland, Cal. No. 643,269. Dated Feb. 13, 1900. This invention relates to an apparatus for cooling air which may afterwards be used under any condition where cooling or refrigerating is needed. It may be applied to refrigerating air in storage chambers of any character. It is particularly applicable to the freezing of ice upon the surfaces of large plates which are submerged in fresh water. The ice at first forms rapidly upon the surfaces of these plates when cooled from the interior by usual methods, but as the thickness of the ice increases, being a poor conductor, the rigidity of the formation decreases and it takes several days to form a thickness of ice as great as desired. The object of this application is to reduce the temperature of water between the gradually forming plates of ice so as to increase the rapidity of its formation by practically freezing from the outside as well as that adjacent to the freezing plate. The invention consists of a brine tank having a coil through which is circulated a refrigerating fluid, and in conjunction with this a rotary blower or air-forcing mechanism having a discharge pipe which enters the brine tank, and the air rising through the brine will be reduced to a very low temperature. By means of an air-conducting pipe connecting the upper portion of the brine tank with the lower portion of the water tank, and suitable distributing mechanism, the air thus refrigerated is passed through the water to be frozen, and, rising to the top, is again conducted to the air-forcing mechanism, by which it is returned to the brine tank and thus circulated.

DISPLAY HOLDER FOR HATS.—Sarah E. Griggs, Woodland, Cal. No. 643,266. Dated Feb. 13, 1900. The object of this invention is to provide a convenient removable attachment for any sort of base bracket, or other holder, made of sufficiently stout wires and providing the requisite elasticity with finger holes or loops, so that the arms can be pressed toward each other for the purpose of easily removing or replacing a hat without damage to the fragile structure.

WHEELED SCRAPER.—W. C. Bradford, Arbuckle, Cal. No. 643,263. Dated Feb. 13, 1900. This invention relates to improvements in scrapers which are mounted upon wheels, and comprise an excavating and transporting pan and carrier. It consists of a two-part pan, acting as a scraper, these parts being suspended from a framework which is mounted upon bearing wheels, and in conjunction with this are mechanisms by which the pan is lowered and tilted so that the cutting edge will engage the ground, and the device thereby be loaded; a means by which the pan is suspended above the ground when loaded so as to be transported to any desired point, and means for opening and separating the two parts to discharge the load at any desired point.

SLIDING DOOR LOCK.—J. A. Eastman, Fruitvale, Cal. No. 643,245. Dated Feb. 13, 1900. The object of this invention is to provide a lock which may be used for doors, sashes and other parts which are to be locked together. It is especially applicable to folding doors, the edges of which are brought together when the doors are closed, and which are separated by moving them apart. When such doors are large and heavy and settle or get out of line it is difficult to keep them in condition to be properly locked. In this invention the difficulty is overcome by providing for such movements of the locking bolt as will compensate for any settling of one part of the door or the other. This is effected by first projecting the locking bolt forward into the larger portion of the slot of the opposite door, then dropping it down until the head is engaged with the narrow portion of the slot and finally drawing it back against said slotted portion so that it will pull the doors close together in case they are inclined to separate. The opposite movement of the bolt serves to first clear it from the slotted plate, then raise it, then withdraw it through the wider portion of the slot and into the casing of its own door. By suitably arranged mechanism all these movements are effected by the turning of the key in one direction or the other.

Latest Market Reports.

SAN FRANCISCO, Feb. 22, 1900.

This is a legal holiday. Yesterday's quotations were as follows:

SILVER—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59¾ cts. (1000 fine); San Francisco, 59¾: Mexican dollars, 47½c.

COPPER.—New York: Lake, 1 to 3 casks, 16.75 cash; carload lots, 16¼; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.00; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17½@18. Mill copper plates, 21½c; bars, 23½@25c.

LEAD.—New York, $4.70; St. Louis, $4.70; San Francisco, $5.00; pipe 7½, sheet 8¾, bar 6½c. London, Soft Spanish Lead, £16 12s 6d=4.75c per lb.

SPELTER.—New York, $4.70; St. Louis, $4.70; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY.—New York, 9½c; San Francisco, 1000-lb lots, 10c; 300 to 500 lbs., 11@14c; 100-lb lots, 15@18c.

BABBITT METAL.—San Francisco, No. 1, 10c.

IRON.—Pittsburg, American soft—pig—large lots—$25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c.

STEEL.—San Francisco, bar, 12c to 20c per lb.

QUICKSILVER.—New York, $51.75; London, £9 14s; San Francisco, local, $51.50 ℔ flask of 76½ lbs.; export, $47.50.

PLATINUM.—San Francisco, crude, $16 ℔ oz.; manufactured, $19@22.

FERRO-MANGANESE.—San Francisco, ℔ ton, $30.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

TIN.—New York, pig, $32.50; San Francisco, $34.50; bar tin, ℔ lb, 40c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 40c to 50c.

NICKEL.—New York, 40@45c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.80 50-lb lots; San Francisco, $2.50 to $3 lb lots.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ℔ set; 14 oz., 40s., 11c.

FERRO-TUNGSTEN.—New York, 60c; San Francisco, 75c (60%).

MAGNESIUM.—New York, $3.50 ℔ lb.; San Francisco, $4.50.

TUNGSTEN.—New York, ℔ lb., 75c; San Francisco, 90c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 34@36c ℔ lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, 1¾c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, strictly pure, boiled, bbl., 68c; cs., 73c; raw, bbl., 66c; cs., 70c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 55c; cs., 60c; No. 1 bbl., 45c; cs., 50c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 65c; No. 1 bbl., 52½c; cs., 57½c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, **Money** loaned mines, **Mining** companies organized, their property exported, financed and managed, **Mines**, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, **Examine** mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and Chemical work done. EDW. N. BREITUNG, Marquette, Mich., U.S.A. CABLE ADDRESS, EDBRE. CODES: LIEBER'S, BEDFORD MCNEIL'S, A B C UNIVERSAL COMMERCIAL.

Quicksilver

—FOR SALE BY—

The Eureka Company,

OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

COAL.—San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs' $10.05; Colorado Anthracite, $14.50.

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 21, 1900.

9:30 A. M. SESSION.

200 Alta 01c	50 G. & C.....15c
300 B. & B.....32c	300 Mexican.....19c
200 Challenge...18c	200 Ophir 54c
500 Chollar 18c	300 Potosi 25c
100 C. C. & V.$1 40	1000 Sierra Nev..35c

2:30 P. M. SESSION.

300 Mexican.....20c	100 Sierra Nev..36c
300 Crown P't...07c	100 Union Con...24c

SITUATIONS WANTED.

BY ENGINEER, AS CHIEF IN MINE. Married, and will go anywhere. Efficient in steam, hydraulic, pneumatic and electrical power transmission. References. Address LOUIS B. GORDON, 1757 Howard Street, San Francisco, Cal.

Wanted.—Position as Assayer

For Gold and Silver Ores, or as Assistant Assayer. Eighteen months' practical experience. Address Box 78, West Berkeley, Cal.

WANTED.—By a Practical Miner and MINING BUSINESS Man, Position as Manager or Superintendent. Speak some Spanish. Would leave the United States if necessary. Good references. Address SUPERINTENDENT, this office.

Mining Engineer and Metallurgist, technically educated, with fifteen years of practical experience, is open for a new engagement as expert or superintendent. Specialty the treatment of rebellious silver and gold ores. Experienced in designing, building and running reduction works. Speaks and writes Spanish fluently. Address ALPHONSE BENO, P. O. Box 814, City of Mexico.

WANTED.

WANTED.—A Second-Hand White Howell Roaster, also a Revolving Drier.

Must be in good repair. Address ARTHUR HENDEY, Agent, Copper Chief Mining Company, Jerome, Arizona.

WANTED.

PARTY TO DEVELOP A COPPER PROSPECT,

ONLY FIVE MILES FROM RAILROAD.

138-foot shaft. Several tons of ore on the dump. High-grade rock. Address G. F. CLARK, Tempe, A. T., care of I. S. Watrous.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from A. B. Jacks, in the Badger Hill Mine, near Spanish Ranch, Plumas Co., to deposit tailings in Whitlock Ravine; from Manuel Leal, in the Union Mine, in New York Township, Yuba Co., to deposit tailings on New York Flat; from Walter E. Peterson, in the Manila Placer Mine, near Igo, Shasta Co., to deposit tailings in a worked-out pit; and from the Cherokee Gravel and Gold Mining Company, in the Cherokee Gravel Mine, near Carter's, Tuolumne Co., to deposit tailings in Bear Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on March 5, 1900, at 1:30 P. M.

Wealth Producers.

Copper mining has been more profitable than any other business undertaking.

STATISTICS SHOW THE GREAT RESULTS. WRITE FOR PAMPHLET.

COLONIAL COPPER COMPANY, 32 Broadway, N. Y.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

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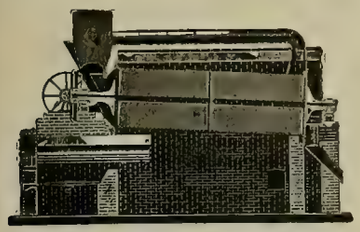
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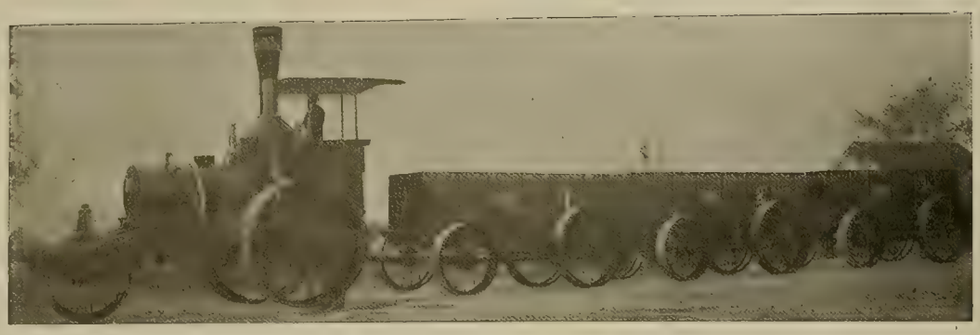
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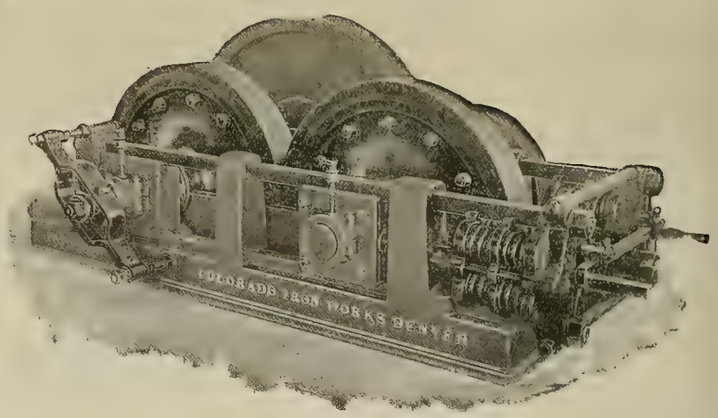
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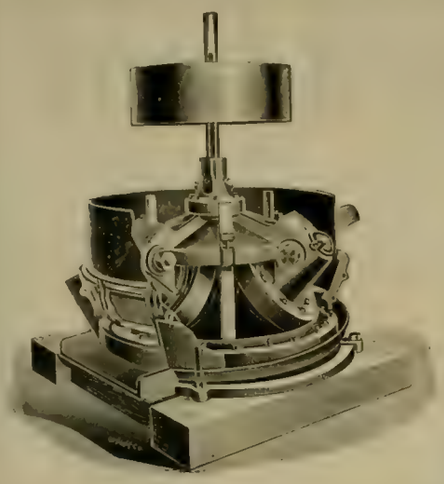
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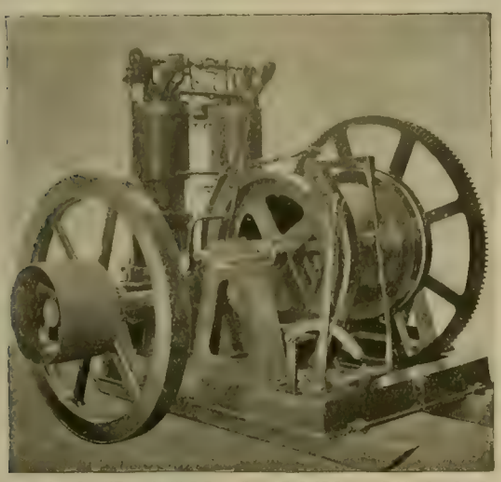
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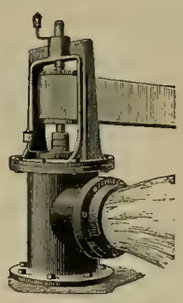
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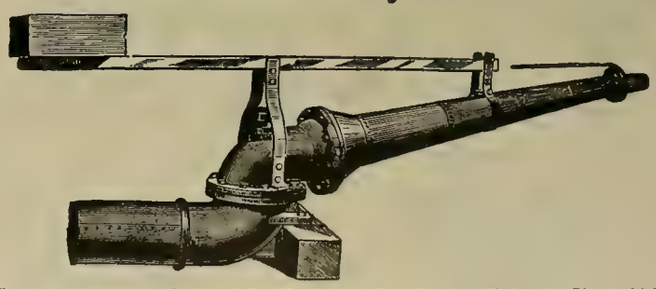
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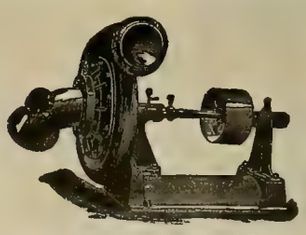
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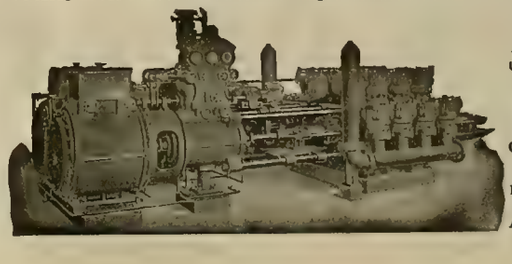
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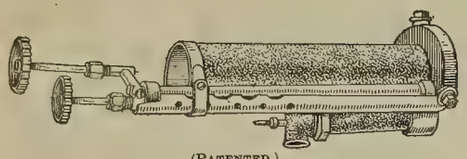
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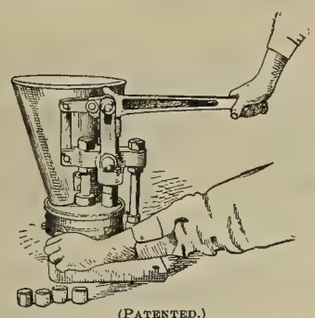
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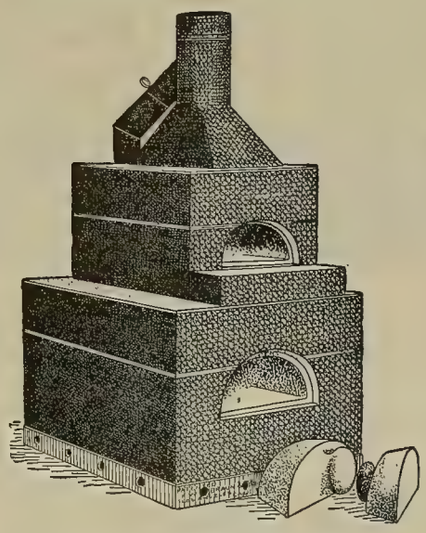
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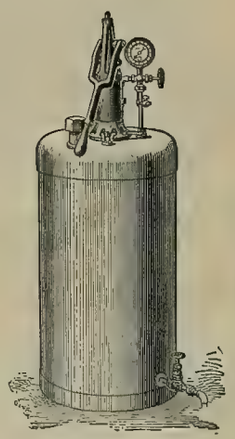
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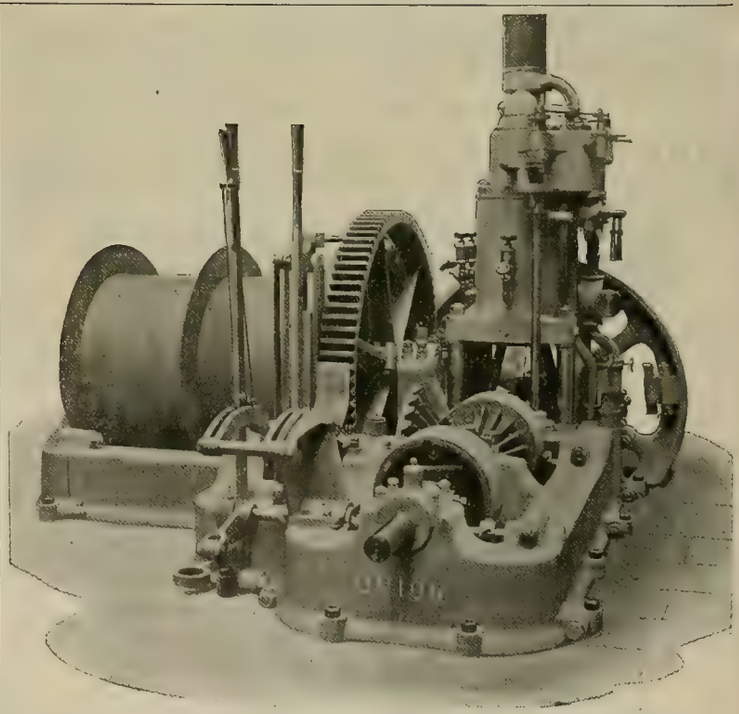
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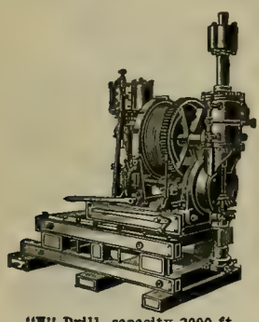
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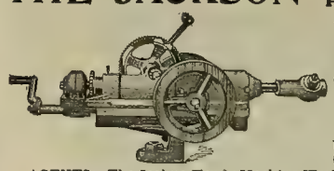
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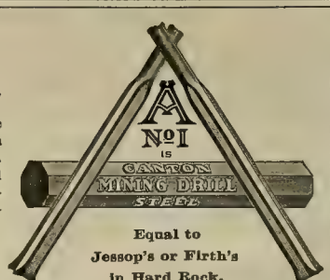
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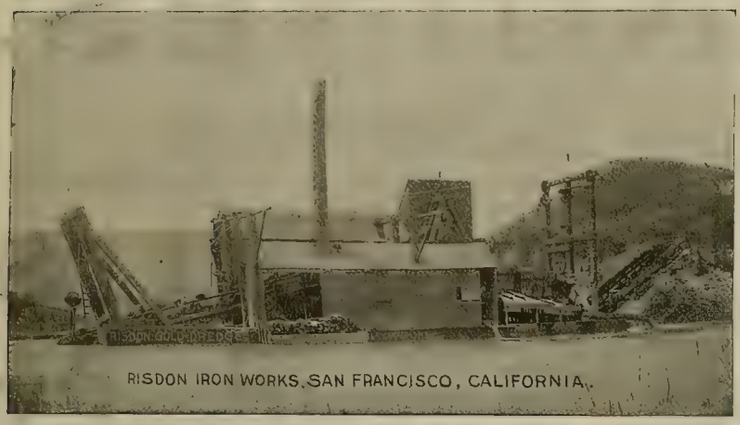
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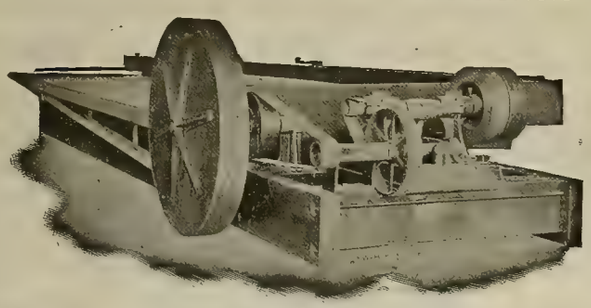
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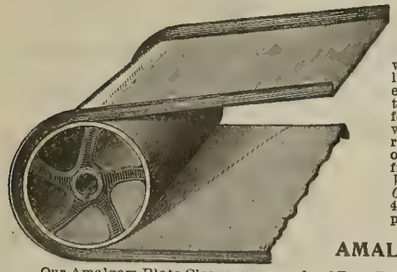
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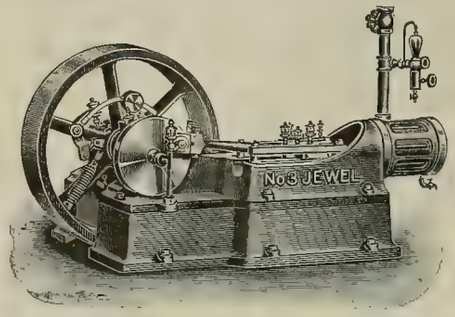
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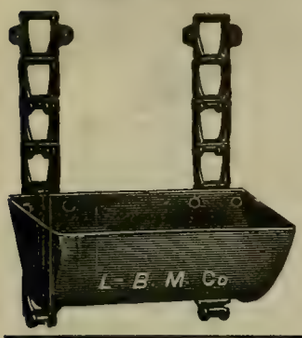
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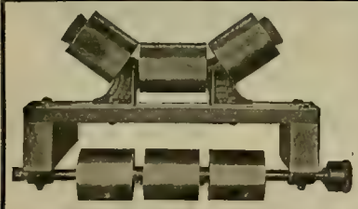
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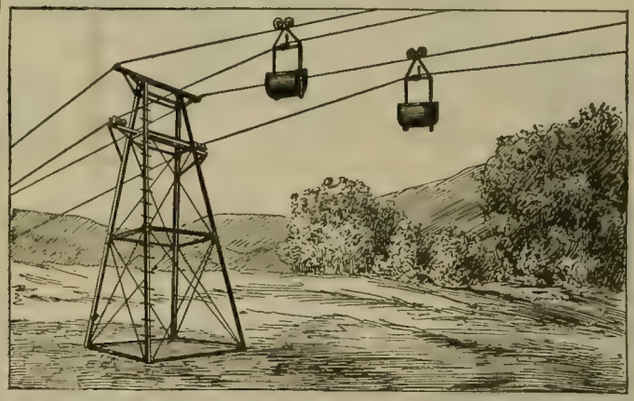
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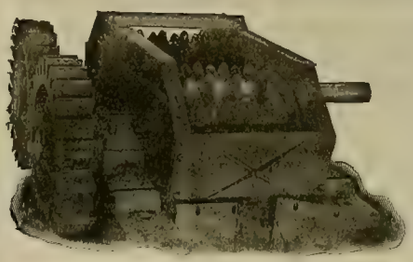


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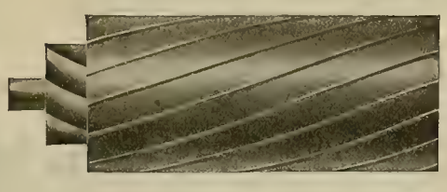
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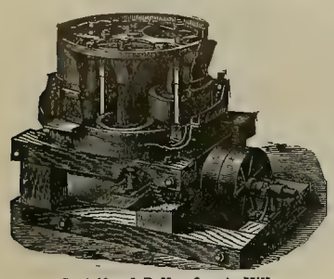
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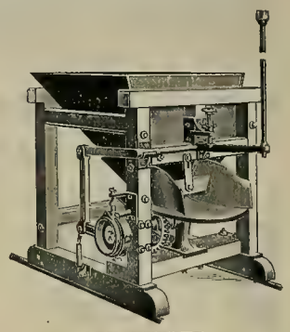
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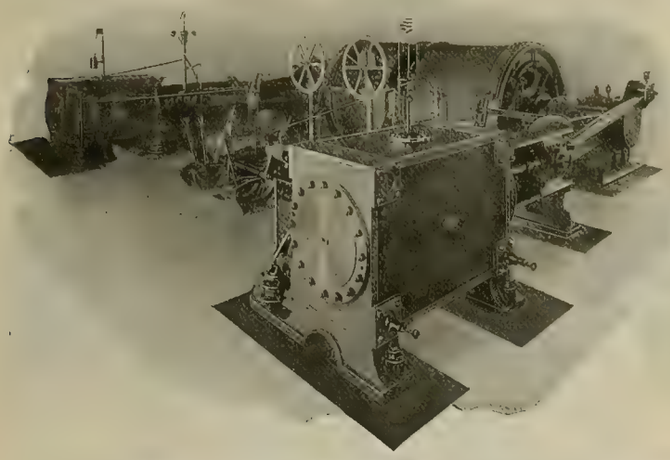
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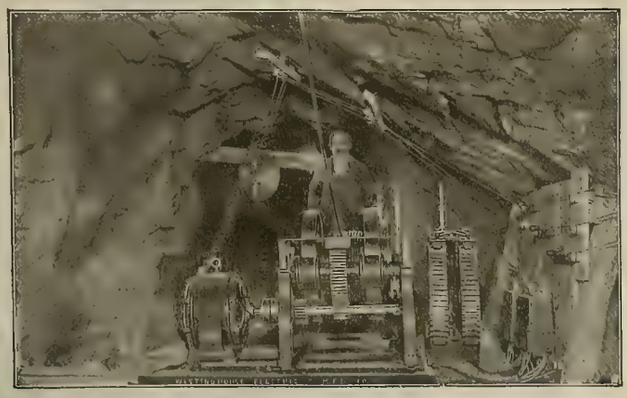
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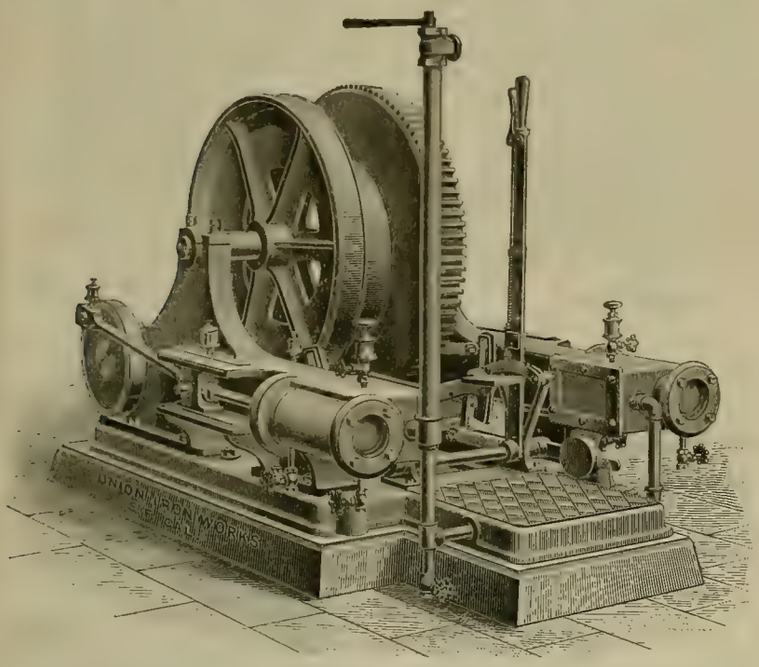
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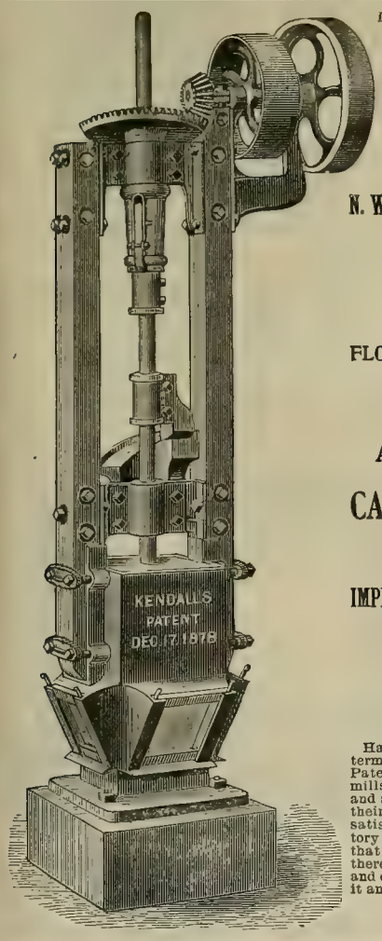
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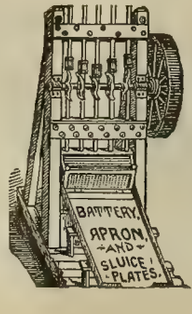
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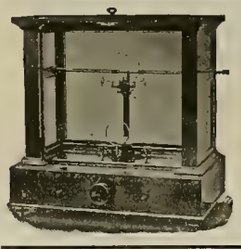


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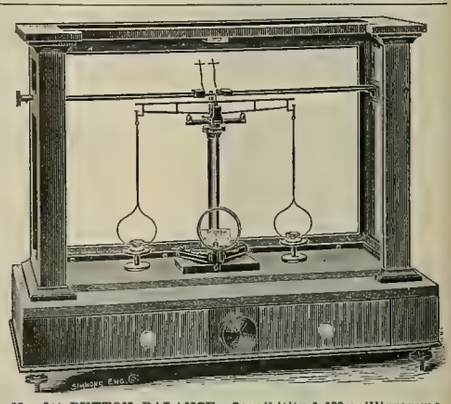
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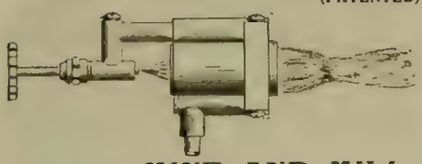
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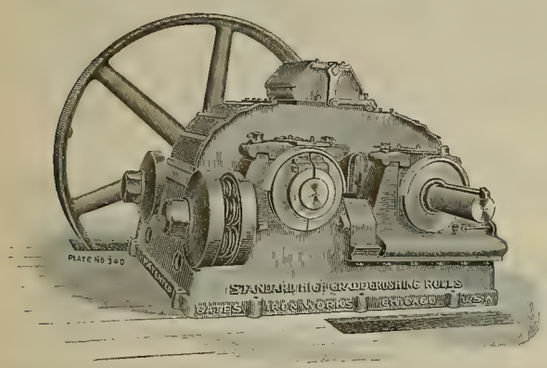
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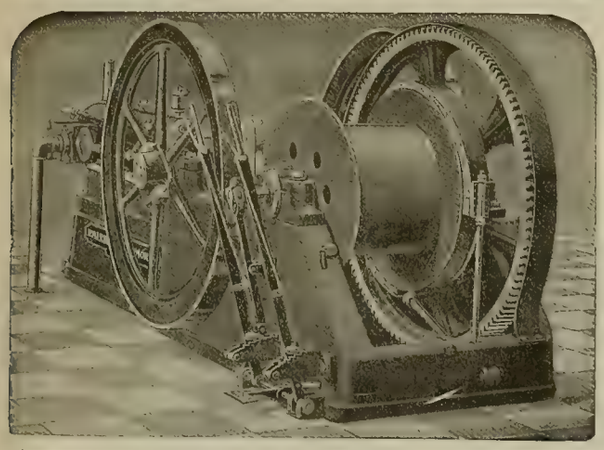


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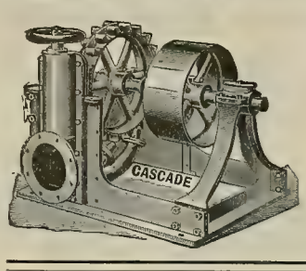
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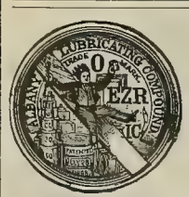
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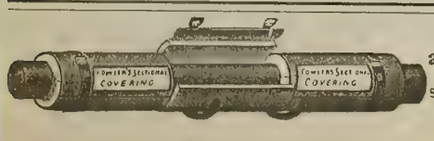




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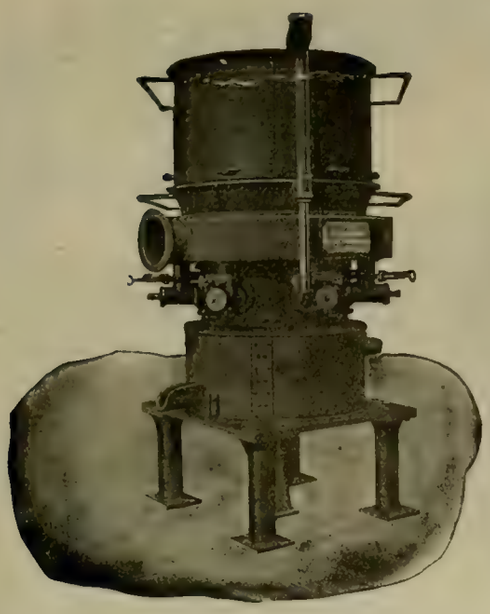
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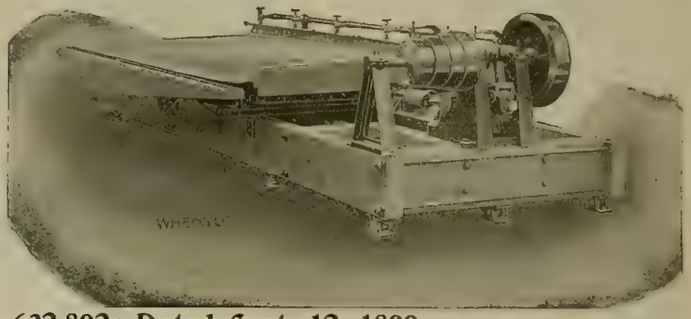
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MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of January, 1900, an assessment (No. 22) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of February, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 19th day of March, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1900, an assessment (No. 2) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of March, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, room 36, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 15) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of March, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 118) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on Tuesday, the 13th day of March, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of April, 1900, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 14) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 9, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of March, 1900, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 9th day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary

Office—320 Sansome street, room 9, San Francisco, California.

STOCKHOLDERS' MEETING.

Notice of Stockholders' Meeting of the Union Hill Consolidated Mines.

In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated Mines, a meeting of the Stockholders of this Company will be held at 11 o'clock in the forenoon on Tuesday, the 27th day of February, 1900, at its principal office, 320 Sansome St., room 24, San Francisco, California, to consider and vote upon the proposition to increase the Capital Stock of this Company to four hundred thousand ($400,000) dollars in 400,000 shares at the par value of One Dollar each.

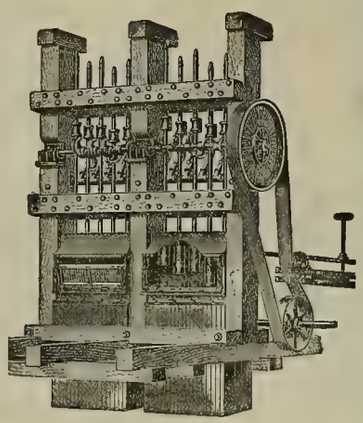
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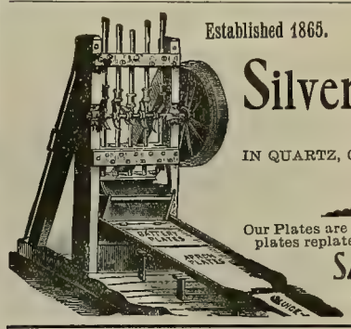
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DELINQUENT SALE NOTICE.

QUINCY MINING AND WATER COMPANY.—Location of principal place of business, San Francisco, California; location of works, Spanish Ranch, Plumas County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 2nd day of January, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No Cert.	No. Shares.	Amt.
Alfred Burns	50	100	$40 00
Mrs. F. G. Brown	73	300	120 00
Frances Camille Berthiaume	109	1,850	740 00
Frances Camille Berthiaume	110	2,000	800 00
Mrs E. J. Cadwallader	15	500	220 00
P. Crowley	101	250	100 00
R. R. Grayson	65	1,000	400 00
Alice B. Munroe	20	100	40 00
James W. Orndorff	22	50	20 00
Warren Olney	32	100	40 00
Thomas Quigley, Trustee	103	1,000	400 00
W. C. Ralston	89	1,000	400 00
W. C. Ralston, Trustee	52	1,000	400 00
W. C. Ralston, Trustee	53	1,000	400 00
James Simpson	102	750	300 00
John Young	12	200	80 00
		11,500	$4,600 00

And in accordance with law, and an order from the Board of Directors, made on the 2nd day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, No. 439 California street, San Francisco, California, on MONDAY, the 5th day of March, 1900, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

THOMAS QUIGLEY, Secretary.

Office—No. 439 California street, San Francisco, California.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 10) levied on the 4th day of January, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
F. F. Anthes	185	250	12 50
E. Hartmann	188	100	5 00
E. Hartmann	201	650	32 50
H. H. Hartmann	143	75	3 75
H. H. Hartmann	150	25	1 25
H. H. Hartmann	202	400	20 00
A. Schwartz	152	250	12 50
B. Strueven	184	500	25 00

And in accordance with law, and an order from the Board of Directors, made on the 4th day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 773 Mission street, San Francisco, California, on MONDAY, the 5th day of March 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

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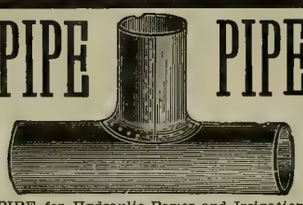
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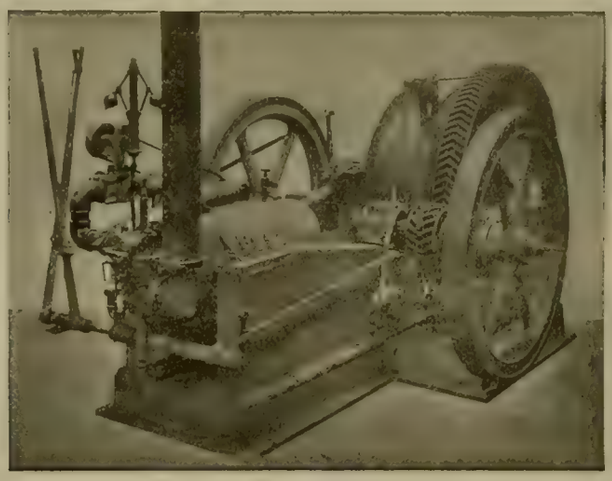
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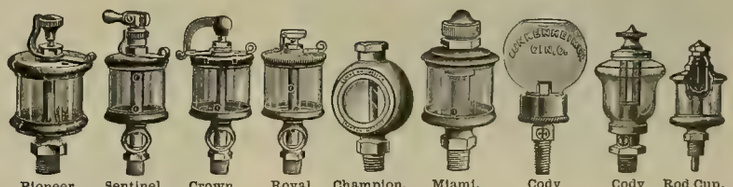
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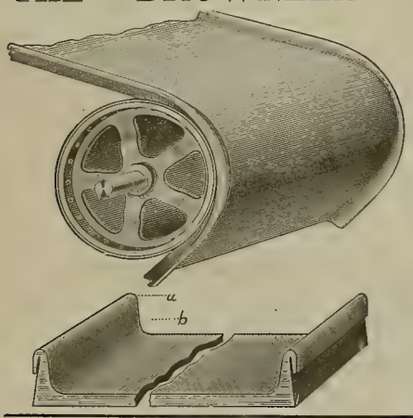
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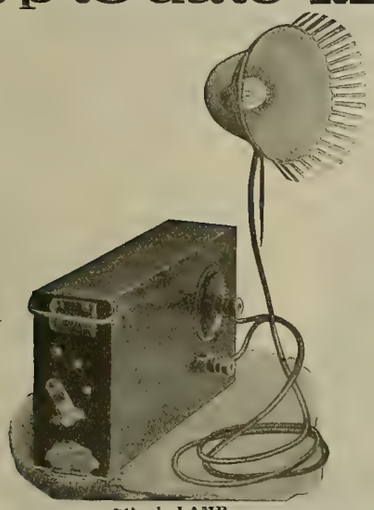
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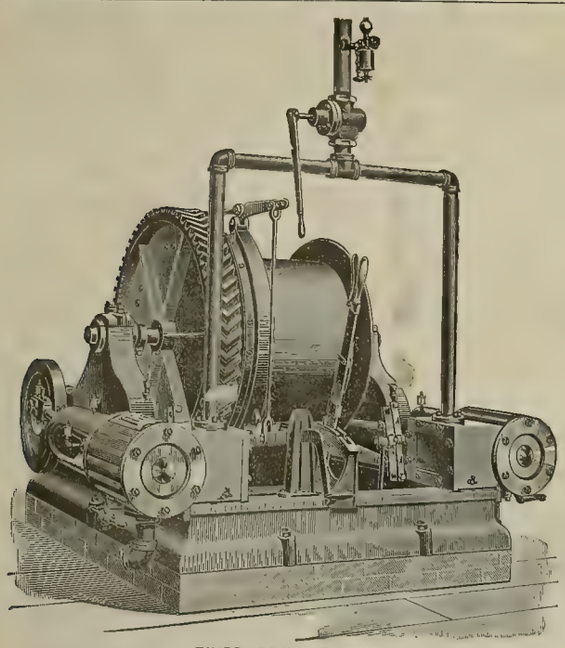
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Something New in Engineering.

Editorial note was made in the issue of the 17th ult. of the new plan of the California Debris Commission for impounding debris in the Yuba, Cal., river, which involves something novel in engineering. The problem is a vast one, commensurate with the extent and novelty of the plan proposed for its solution by the United States engineers. The idea in general is to control the flow of water by a series of dams. This plan as conceived by the engineers in charge, endorsed in their report and approved by the chief of engineers, is to store and hold the mining debris in the Yuba river above the point where the work shall begin, to construct a series of large settling basins in which the water shall deposit the debris it carries down, and to regulate the flow of the stream through its low-water channel. A series of several barriers built across the bed of the river, and of subsequent dams, parallel levees and settling basins of considerable extent constitute the detail of this novel engineering project, which is the result of long-extended experiment and investigation. The project itself, in its entirety, is largely experimental, and attempts to deal with untoward conditions that exist on an unusually extensive scale, for in this instance it is not a question of controlling the water, but of checking the advance of millions of cubic yards of fine soil carried down from the Sierra foothills. The engineers in charge explicitly direct attention to the fact that the continuance of hydraulic mining is to them a secondary consideration, and that their sole present idea is to successfully store existing debris in that vicinity and improve the present condition of the Yuba river. They say that, after many years of consideration of all the problems presented, they have rejected all previous plans or projects, and believe that $800,000 public money could be judiciously expended in an effort to put the present plan in actual operation. There is at present available therefor a joint State and federal appropriation of $500,000.



Museum of the California State Mining Bureau, Ferry Building, San Francisco, Cal.—(See page 233.)



Black Bear, War Eagle Mill, Flume, Driveway and Office; Mill Being Remodelled for Twenty Stamps, Loomis, Wash. (See page 239.)



Gasoline Hoist, Black Bear Mine, Palmer Mountain, Okanogan County, Wash. (See page 239.)



Black Bear Mine, Palmer Mountain, Wash., Showing Shaft, Gallows-Frame, Ore Chute, Bunkers, Waste Run and Engine House. (See page 239.)

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Committee's Unanimous Report.

Reference was made in the issue of the 17th ult. to the bill introduced in Congress to create an executive department of mines and mining. Following is the report of the Committee of Mines and Mining unanimously recommending its passage:

The Committee on Mines and Mining, to whom was referred the bill (H. R. 5030) to create an executive department of mines and mining, to be known as the "Department of Mines and Mining," unanimously report the accompanying bill and recommend its favorable consideration and passage by the House of Representatives.

The bill consists of nine sections.

Section 1 provides for the creation of another department, to be known as the "Department of Mines and Mining," the design and duties of which shall be to acquire, by examination, practical and scientific experiments, geological research, or otherwise, useful information on the subject of mining in the comprehensive sense of the word, including mines and mining for gold, silver, platinum, lead, copper, iron, marble, tin, zinc, quicksilver, antimony, aluminum, manganese, nickel, coal, petroleum, natural gas, stone, clays, cement, emery, infusorial earths, phosphate rock, gypsum, salt, borax, bromine, sulphur, chrome iron ore, metallic paints, asphaltum, flint, and all other minerals and mineral water, as well as waters used in mining, manufacturing, or developing electric power, and to diffuse such information among the people of the United States.

Section 2 provides for a secretary of mines and mining, his appointment by the President, by and with the consent of the Senate, and makes certain sections of the Revised Statutes applicable to said department.

Section 3 provides for an assistant secretary and the mode of his appointment.

Section 4 provides that the secretary shall receive the same salary now paid to the secretary of each of the Executive Departments, and that the assistant shall be paid the same salary as is now paid the First Assistant Secretary of the Interior.

Section 5 prescribes the duties to be performed by the proposed department.

Section 6 provides that the Geological Survey shall be transferred to the department of mines and mining.

Section 7 declares that all officers and employes of the Government or any bureau or division engaged in duties referred to in section 5 of this bill shall be transferred to the proposed department.

Section 8 provides for the transfer of all records, maps, documents, surveys, machinery, now possessed or used by any existing Department, to the department of mines and mining; and

Section 9 provides that this Act shall go into effect on March 4, 1901.

The want of practical and scientific information on the subjects connected with mines and mining by the people of the United States is apparent. It is difficult, if not practically impossible, to get real data—the necessary practical facts upon the subject. The useful, necessary, and scientific facts, if known at all, are beyond the reach of the people. No country in the world is richer in its mineral resources than ours, and yet we probably have less information upon the subject accessible to the people than in any other leading nation in the world.

In most of the leading countries of the world there is either a council general, commissioner, secretary, or minister of mines and mining, with duties similar to those proposed by this bill. Almost all the great nations have more cabinet secretaries or ministers than we have. England has 17; Canada, a responsible government of the English nation, has 13. The German Empire has 12; Prussia, a responsible government of that Empire, has 10; so has France, Victoria, and New South Wales. Italy has 11. Honduras, Denmark, Hungary proper, Austria proper, and New Zealand each has 9, while Queensland, Colombia, Netherlands, Persia, Portugal, Roumania, Spain, Sweden and Norway, and Switzerland each has as many cabinet secretaries or ministers as has the United States. Measured by the other leading and commercial nations of the world, with the addition of another member of Cabinet to the official family of the President the United States can not be said to have too large a Cabinet.

In England this great industry of mines and mining is looked after in a distinctive branch of the "Department of sciences and art." France has a council general of mines. Germany has a minister of public works who has charge of mines. New South Wales, New Zealand, Queensland, Victoria and Persia each has a minister or secretary of mines.

The development of our own resources would do away with the necessity or fact of importation of mineral products, open new mines, enlarge others, and increase the demand for labor.

The asphaltum beds of the Uncompahgre Reservation in Utah, and elsewhere in the United Sates, are inexhaustible, and yet there is imported annually into this country from Cuba and Trinidad $300,000 worth of asphaltum. The development of this industry would keep this money at home and give employment to many people. The practical facts as to how to mine these fields and carry the product to market with profit to the mine owner and give reasonable wages to wage earner would be an item of much value.

Five hundred thousand dollars' worth of mineral waters are annually imported into this country from foreign nations which go to pay their owners and laborers, while the best and greatest variety of mineral waters in unlimited quantities are to be found in our own country going to waste, and our people remain idle for the want of employment. The practical information as to where they are and how to develop, bottle and market these waters are among the practical facts which are wanted. Bulletins or books of information upon this subject should be distributed among the people. The State of California has taken out of her mines $1,300,000,000 in gold since 1848, and yet that industry is said to be practically at its beginning. Information shows that there are mountains of refractory ore rich with gold which are not to be reduced by any known process. Hydraulic mining in that State has been enjoined and that kind of mining stopped, except in a limited way. The courts compelled these mines to close down because the debris therefrom by torrential waters were carried from the mine into the navigable streams in such quantities as to impair their navigability, and also to cover up the farms in the valleys below. This State turns out nearly $20,000,000 in gold annually, and if hydraulic mining could be again carried on it is estimated that this sum could be swelled to $30,000,000 annually. Practical information as to how to reduce these refractory ores and to carry on hydraulic mining without injury to navigable waters and the farms below by restraining dams, sluices, or in some other way would more than compensate the expense of the department of mines and mining proposed by this bill for a century to come.

While this report might be extended on these lines almost without limit, it is thought further illustrations which suggest themselves would serve no purpose here.

Notwithstanding the lack of information, this industry has made wonderful strides. The output of coal in 1849 was 4,000,000 tons, in 1896, 186,000,000 tons; iron, in 1850, 600,000 tons; in 1896, 9,000,000,000 tons; lead, in 1850, 18,000 tons; in 1896, 188,000 tons; gold, in 1848 was $5,000,000; in 1896, $60,000,000; mineral waters in 1880, $500,000; in 1895, $4,260,000; mineral paints, in 1880, $135,000; in 1896, $621,000; copper, in 1880, $11,500,000; in 1896, $50,000,000; petroleum, in 1880, $24,000,000; in 1896, $60,000,000.

Electricity and all other power generated by water may be and is properly defined to be the finished product of which water is the ore. It is therefore properly classified under the head of mines and mining.

The annual output of mines and mining is of great magnitude and runs into the billions of dollars. The output of mines alone, in the restricted use of that word, is over $1,000,000,000 annually, and employs about 1,000,000 wage earners.

Taking into consideration the transportation and handling the products of the mines, the number of people employed is more than twice as many as are engaged in turning out the ores from the mines.

The application of electricity and water in mining and manufacturing can not be overestimated. The study, development, and application of such power it is confidently claimed will make practicable and feasible the building up of new industries where none exist to-day, by reason of the present prohibitory cost of fuel.

This measure is not local, but extends to and covers the whole corporate limits of the Union. The people are practically unanimous for such a measure and there is no known opposition.

There is no leading country in the world which has given so little attention to this subject as has the United States.

It can not be expected that either of the heads of the departments, bureaus, or commissioners can do any more work than they now perform. It is a fact known to all who have business with the departments that each and all of them are overworked and overcrowded with work.

The department proposed by this bill is a necessity, and your committee earnestly urges the passage of the accompanying bill.

It has taken five years' continuous work to get the matter so far along; and, while it is in good shape, the friends of the measure must not assume that it will be immediately successful. There is no special opposition to the measure; every one to whose attention the matter is brought agrees that it is a present national necessity, but there exists in many quarters the chilly inertia of indifference that retards any movement, however worthy. The one thing needful now is for every one everywhere who takes an interest in the advancement of the industry to advocate by voice and pen the passage of the bill. The question is now merely one of votes in Congress (assuming that the Senate Committee concurs), and, if the attention of our national legislators is urged to its consideration, there is probably not a member of either house who would oppose it.

The only impending present possibility of failure would be the tendency of different regions to begin forwarding the claims of some favorite son of that section to receive the presidential appointment. That should not appear. The moment there were apparent effort to lobby or logroll for any individual in connection therewith, that moment active interest and co-operation ceases. Men will work for a principle and co-operate for a cause, but naturally and justly resent the injection of personality therein; time enough to consider the question of appointment after the measure has passed. The position will probably go to some one east of the Alleghanies. Since the known acquiescence of the U. S. Geological Survey in the bill, there is no real obstacle to its passage; and, while even stronger arguments for the passage of the bill than those adduced by the committee as above could be cited, yet the heartiness and unanimity of the committee presages favorable action by the national Legislature toward this necessary measure.

TO MINING ENGINEERS AND METALLURGISTS of good repute publicity is a necessity in a business point of view, for, no matter how well known a man may be, or how skillful and successful, he is apt to be forgotten unless he keeps himself before the public, because of likelihood on the part of the public to forget a man in the absence of any notice of him in the papers that are read by the men to whom he naturally looks for engagements. It is the experience of men in and out of the offices of a mining paper that no part of a mining engineer's time is spent with greater advantage to himself than when he is writing some of his practical experience for some publication read by the mining world. This is the age of advertising, and, no matter how skilled or prominent one may be in his specialty, competition is now so great that it becomes a necessity for him who would not fall behind to keep his name before the public.

FOLLOWING closely upon the development of a good mine or mines comes the parasite of the mining business. He is never a beginner, but waits until the energy or money of other men make a place for him to attach himself. He is the individual who sends out the smoothly worded prospectus, in which is an elaborate description of good mines, which constitutes the information concerning the investment offered. His effort is expended in telling what good things there are in the section where his proposition is, resting the merits of his offer upon those of other enterprises—a purely parasitical method. Were he forced to attempt business on the merits of his own scheme, he would, in the majority of cases, have little or no material for his prospectus.

Concentrates.

THE population of California in 1880 was 804,836; in 1890, 1,208,130; in 1900, probably 1,800,000.

ZINC, lead, magnesium and antimony have white rusts, not soluble in water. Gold and platinum never rust.

THE pressure per square foot at the foot of a standpipe filled with water, 105 feet high, is 6562.5 pounds.

A MINOR born in the United States can locate and hold a mining claim, but during legal infancy can not directly transmit title.

ONE POUND of liquid ammonia, evaporated under pressure of twenty-five pounds per square inch, will occupy about 9 cubic feet.

A BELL weighing 500 pounds would be 29 inches diameter, 22 inches in height, would take a frame 42x46 inches, and a wheel 43 inches diameter.

IF a fan making fifty revolutions per minute passes 18,000 cubic feet of air, a fan making eighty revolutions per minute should pass 28,800 cubic feet.

IF 10,000 cubic feet of air per minute pass through an airway 7x8 inches, 5109 cubic feet per minute will pass through an airway 5x5 inches, length of airway and power being the same in both cases.

THERE is scarcely a mining camp in Colorado that has not some hot or mineral spring. There are hundreds of mineral springs in California, but in lower altitude and not generally associated with metal mines.

TO DEVELOP 100 H. P. (theoretically) under a head of 56 feet would take 120 gallons water per second. A flume 1500 feet long, with 6 feet slope, would need to be 10.7 inches square to discharge the required amount.

A WURTS non-arcing lightning arrester, such as furnished by the Westinghouse Electric & Manufacturing Co., would work satisfactorily for alternating or direct current circuit from 1000 to 15,000 circuit voltage.

IN leaching works where silver is extracted from the ore by sodium hyposulphite and precipitated as sulphide the best method for refining the sulphide is to cupel it with lead, fine silver bars being the resultant product.

IN California stamp mill practise it is not uncommon to run 1000-pound stamps continuously at 120 drops per minute. Mill men argue economy of power in high battery speed, the cam engaging the tappet on the rebound of the stamp.

IN notices of forfeiture to joint owners for non-payment of necessary annual assessment work upon unpatented mining claims the notice must be published for ninety days, and the party so notified has ninety days after the last publication to pay up.

IN Colorado any one milling, sampling, concentrating, reducing, shipping or purchasing ore is by law required to keep and preserve a book in which is entered required data as to each lot of ore, when received or delivered. There is no similar law in California.

SULPHIDE ORES require to be crushed fine, both for sampling and subsequent treatment. "Cracking" the ore does not suffice where the percentage of sulphides is above 3. In smelting, ores containing 15% or more of sulphur should be previously roasted. There is no preparatory roasting in pyritic smelting.

UNSURVEYED mineral land is open to prospecting or purchase by citizens of the United States, or those who have made declaration in accordance with Sec. 2319 U. S. Statutes. An affidavit as to citizenship may be taken before the register and receiver of any U. S. land office, or any other officer authorized to administer such oath.

THE compendium of the annual report of the United Verde Copper Co., on page 237, shows that an average of 13.3 cents per pound was received for the mine's output for the year. The report of the Quincy, Mich., Mining Co. last week showed that a net average price of 17.1 cents per pound was received for its last year's product.

THE factor of safety of a hoisting rope should not exceed one-tenth of the breaking strain. If the breaking strain be 100 tons, the maximum safety load should not exceed 10 tons. Breaking strain reduces as the age of the rope increases; sudden jerks develop inert force and multiply the strain on the rope; starts with a slack rope cause excessive strain.

PYRITIC smelting is not yet viewed by all metallurgists as a perfect or wholly satisfactory process, and from a commercial standpoint the subject is one of continued discussion. An inquiry directed to the superintendent of the smelter at Oakdale, Georgia, W. H. Nutting, Bingham, Utah, or Supt. pyritic smelter, Leadville, Colo., might elicit some data.

QUOTING an analysis only, or giving solely the results of an analysis, gives no idea of the value of a bituminous coal beyond its sulphur, moisture and ash. Two coals may read precisely alike in analysis and one be comparatively worthless. The evaporation of water is the measure of value of a steam coal—not a laboratory experiment, but a practical test in bulk.

THE cost of running a small gold dredger should not average over $200 per week—that is allowing $125 for wages, $50 for fuel, and $25 for repairs, etc. If the dredger handles 10,000 cubic yards per week that would be at a cost of 2 cents per cubic yard. If the material averaged 6 cents per cubic yard there should be an approximate profit of $400 per week on an investment of from $25,000 to $40,000. Eighteen cubic feet of gravel in place will weigh 2000 pounds. A cubic yard will weigh one and one-half short tons.

A CLASS $4\frac{4}{5}$ C electric locomotive on a 2% grade exerts 1800 pounds draw-bar pull; if the car friction is decided to be 35 pounds per ton, the train resistance per ton will be that due to grade, 2x20, plus friction 35, equals 75 pounds per ton: then draw-bar pull, 1800, divided by 75, equals 24 tons train (cars and lading) hauled up the limiting grade.

EVERY reputable mining and trade journal rejoices and aids in awakening or creating the California oil development, and is equally agreed in frowning upon injury to such legitimate development by formation of companies designed to work the credulous or lure the unwary, for upon the actual success of initial operations hangs largely the fullest measure of future success.

IN the Fresno, Cal., water power pressure, at full flow at a head of 1411 feet, a sudden stoppage in the water flow will raise the hand on the pressure gauge to 1000 pounds per square inch. A stream of water from one of the deflecting nozzles will quickly bore a hole through a 3-inch plank; it will tear a hole through a $\frac{3}{8}$-inch steel plate in a few days; concrete would melt before it like sugar.

THE specific heat of a substance is its thermal capacity compared with that of water—that is, it is the ratio of the quantity of heat required to raise the temperature of a given weight of the substance 1° to the quantity of heat which will raise the temperature of an equal weight of water 1°. Latent heat does not exhibit itself by any rise of temperature and cannot be detected by the thermometer.

THE rotary converter as used for electrolytic work is simply a commutating machine. When supplied with alternating current at proper frequency and voltage it delivers direct or continuous current at the required potential. By its use it is possible to secure the advantages of the alternating current for transmission from the source of power and then to transform the electric energy into direct current.

IT is the duty of every mine manager and mine surveyor to have a complete and accurate map of the mine. One that is not complete and correct, or at least correct as far as it goes, is worse than no map at all. It should especially show all inside workings accurately, and nothing underground should be left to hearsay, remembrance or belief. And a map that was good five years ago or one year ago may be of no present value.

A STANDARD H. P. rating for boilers—thirty pounds water evaporated per hour from feed water at 212° F.: total pounds steam required per hour divided by thirty equals boiler H. P. necessary; approximate consumption of steam per indicated H. P. per hour is for plain slide valve engine thirty-five to forty pounds, high speed automatic engine thirty-two to thirty-six pounds, simple Corliss engine twenty-eight to thirty-two pounds.

A MUFFLE FURNACE is a closed reverberatory, constructed so that the products of combustion from the fuel are not allowed to mingle with gases evolved. It may be one long, continuous muffle, or consist of several muffles built one above the other in furnace construction. Such a furnace is chiefly used for roasting iron pyrites and zinc blende with intent to collect the sulphurous acid fumes free from fuel gases and excessive air, for use in making sulphuric acid.

A "LEVEL" may mean the whole system of workings on an approximately horizontal plane, but is also understood as the main working following or near and parallel with the lode. It may thus correspond to a drift; but is more permanent, since it is a main passage and haulage way, and is kept open until the ground above and tributary to it has all been worked out, or explored so far as indications or means warrant. If there is only one drift on a horizontal plane, there is no confusion of terms.

THE power factor of an induction motor is found by dividing the real H. P. applied to the motor by the apparent applied H. P. The energy supplied to a direct current motor is found by multiplying the current by the voltage, but in the case of an alternating induction motor this product, designated the apparent energy, is greater than the real energy on account of the fact that the current in such motors lags behind the E. M. F., and hence the useful effect is less than would be the case if the current and E. M. F. were coincident in phase.

"BLACK DAMP" is another name for the carbonic acid gas mentioned by A. Thurston Heydon in the article, "That Deadly Gas," in the issue of Feb. 24th. Its composition is two atoms of oxygen combined with one atom of carbon. One thousand cubic feet of it at 32° F., barometer 30 inches, weigh 128.45 pounds. It has neither color nor smell, but an acid taste. It is found in large quantities in the gases occluded by some coals; is also produced in mines by respiration, the burning of lamps, etc. It extinguishes a lighted candle and 8% to 10% of it in air is fatal.

AN air receiver forms an important part of an air compressing plant. It should be placed at a distance not greater than 50 feet from the compressor, and serves a useful purpose by receiving the air in pulsations from the compressor, and delivering it to the service being performed in an even, steady flow. The air as it comes from the compressor also contains more or less moisture, which collects in the receiver and may be drawn off by means of drain cocks. If the heat which is lost from the air during compression is restored just prior to its consumption, a gain in efficiency of 30% to 35% will be realized, and in addition freezing of the air in the exhaust passages of the machines being operated will be prevented. Reheating the air is necessary to the attainment of the best results.

THERE is no power derived or generated by the motion of balance wheels. They only transmit power that is imparted to them when augmenting their motion. Their usual office is to equalize speed by their momentum, through which they transfer the force received at the maximum to the minimum sections of the crank revolution. When a balance wheel is running free, it gives out power while in motion. Its weight in pounds multiplied by its rim velocity in feet per minute is its momentum in foot pounds, and this product divided by 33,000 is its H. P. for any moment.

GOLD in granite is a common California "formation." Around West Point, Calaveras Co.; near Perris, Riverside Co.; in Mono Co., and in northern counties may be found examples. The granite is usually syenitic. Such mines are not phenomenally rich. Probably the richest gold mining yields in California—other than hydraulic mining—mines producing large quantities from narrow veins—have been those found at contact of slate and diabase. That gold is found in limestone in California is well authenticated. The Blackhawk mine, San Bernardino Co., furnishes an example.

ALL workings following the ore channel or the flat may be termed "drifts;" but, besides the many gangways, or "levels," there are lesser prospecting drifts and extensions from stope floors. These, being of a temporary character, are cut with the smallest cross-section compatible with convenience, and timber is spared in them as much as possible. They are usually self-draining, leading the water into the main galleries, whence it flows to the surface, to sump or to pump stations. The floors being mostly uneven, the grade may be about 1:50. Drifts of this character usually follow the ore or the best ore, so that the cost of drifting may be repaid by the ore from the heading as it advances, or the work be done at actual profit.

ANY substance may be a gas or a vapor, according to its temperature. Substances which assume the gaseous condition at ordinary temperatures are termed gases; those which assume the condition of a liquid at the ordinary temperatures of the air are termed vapors when in the gaseous state. This distinction, however, is not scientifically accurate. The critical temperature affords a criterion for such scientific distinction. According to the latter standard, a gaseous substance at a temperature lower than the critical temperature is a vapor, a gas is a substance at a temperature higher than its critical temperature. So that any substance may be a gas or a vapor according to its temperature. Carbon dioxide, for instance, is a gas above 31° C., and a vapor at lower temperatures.

LAVAS are made up of eight chemical elements—oxygen, silicon, aluminum, magnesium, calcium, iron, sodium and potassium. Oxygen is in the larger proportion; so that lavas are mostly oxides. Next is silicon and alumina, giving the quartz, feldspar and silicate element. There are two kinds of lavas—acidic and basic; the former contain 80% silica, the latter 45%; the former are rich in potash and soda, the latter in lime and iron; the former are usually light in color and weight, the latter dark and heavy. Basalt is a good example of a basic lava; rhyolite is an example of an acidic lava. Andesites and phonolites are intermediate. The minerals composing these latter lavas are mostly quartz and feldspar, with the dark minerals mica, augite, hornblende, olivine and magnetite.

TO DETERMINE whether a given low-grade gold or silver ore can be profitably concentrated, take a weighed quantity of dry pulverized ore passed through a 40-mesh screen, such as will be an average sample of the bulk of ore treated, say one pound, after having previously assayed the sample. Pan this quantity carefully into a second pan, and re-pan until all the sulphurets are separated from the gangue, then dry and weigh the sulphurets and assay them; the weight represents the percentage of sulphurets the ore contains. A sulphuret in the old nomenclature was a compound of sulphur with a radical or element. In the latest nomenclature it has been superseded by the term sulphide, but is used to designate certain native undecomposed metallic sulphides, as gold-bearing pyrites. A sulphate is a salt of sulphuric acid.

The principle on which a jig works is the tendency of a mixture of ore particles of approximately similar size, but varying specific gravity, to arrange itself into layers according to gravity when given a motion of adjustment by a pulsating column of water. The ordinary type of jig consists of a water tank divided by a partition above, which does not reach the bottom. On one side of this partition is a horizontal screen on which the sized ore is fed, on the other side a loosely working plunger operated vertically by a crank or other reciprocating device. This plunger causes a regular pulsation of water through the screen, so affecting the particles of ore resting thereon that the heavier particles settle down through the lighter and either discharge through the screen itself or by an appropriate gate above the screen level, the lighter particles of rock moving on horizontally and discharging over the side or end of screen frame. Jigs have usually long wooden tanks with pointed bottoms divided longitudinally by a partition, and also laterally into two or more screen spaces discharging one upon another, and with equal corresponding plunger compartments on the opposite side of the longitudinal partition.

The California Copper Co.

The inception of smelting at Madera, Madera Co., Cal., at the California Copper Co.'s works, is of sufficient interest and importance to justify notice of the plant and the process employed. The mines of this company are at Daulton.

So much has appeared in recent numbers regarding California copper deposits, that little of general information can be published without repetition. Particular attention has not been given to the copper belt in Madera county. The belt that passes through that county is considered the same that extends from Amador on the north to Los Angeles on the south. Though ill defined in many places, it is comparatively uniform and can be traced by croppings some miles apart.

Copper was first mined in Madera county during the '60s, and spasmodic operations have been in progress ever since. In the immediate vicinity of Madera the most prominent mines are the Green Mountain, Ne Plus Ultra and Copper King, all of which are now being developed. The belt on which these properties lie varies considerably in width, but the mineral-bearing portion is confined to a comparatively narrow limit.

The vein, or mineral-bearing zone, is composed of shaly andalusite slates, interbedded with several hornblende minerals, in various states of decomposition, and copper ores, likewise in original and altered conditions. Originally, the copper ore was a mixture of chalcopyrite and pyrite carrying a small amount of gold and silver. As the result of weathering oxidation, leaching and redeposition, there has been formed a capping composed largely of oxide of iron. Below this is found a zone of carbonate of copper of varying thickness. Farther down are found the oxides mixed with sulphides of copper, and, still deeper, the unaltered sulphides. The depth to which oxidation has extended is uncertain, as there are no shafts in the country that have reached a greater depth than oxidized ores have been found. At one shaft in this vicinity complete oxidation has taken place to a depth of 85 feet, and scarcely a trace of copper remains in the decomposed sulphides, while at still another shaft, less than one-half a mile away, the original sulphides are found within 50 feet of the surface.

Local conditions vary so much that it is impossible to predict the depth of oxidation. The ore lies in the seams of the slates, sometimes only in narrow stringers, but quite persistent along their course. These stringers frequently develop gradually into shoots of ore 16 or 20 feet wide. What depth these shoots may have is unknown.

The recent activity in copper mining has caused capital to invest in that section of California; within the last year considerable money has been spent in prospecting, development and equipment. The Ne Plus Ultra mine, now being operated by the California Copper Co., located on the Raymond branch of the Southern Pacific Railroad, thirteen miles from Madera, is now shipping ore to its smelter at Madera. The smelting plant is between the main lines of the Southern Pacific and Santa Fe Railroads. At present a spur runs from the main line of the Southern Pacific to the smelter site, a distance of about a mile. Entering the company's grounds, the cars are run over a sixty-ton railroad scale. The spur then divides into three sub-spurs, of which two are run up at a 5% grade to elevated tracks for the unloading of ores, coke and limestone. The third track is on the general level of the smelter site and is used for the handling of fuel and supplies and the removal of matte from the furnace yards.

The plant consists of several buildings. The boilers, blower, engine, pumps and electric light plant are under one roof; standing next to this, the blacksmith shop, and just beyond this the furnace house, in which is erected a 100-ton, steel water jacket, stack furnace, built by the Union Iron Works of San Francisco.

The land on which the smelter is located is flat, so that to arrange for a slag dump the furnace floor is raised above the general elevation by 8 feet. The fumes and smoke from the furnace are carried through a brick dust chamber about 100 feet long to a wrought iron stack 5 feet in diameter and 75 feet high. The base of the stack is 25 feet high, making the total height 100 feet.

The ore from the cars is unloaded directly either into gravity ore bins or into bedding bins. Near the ore track is a sampling mill containing breaker and rolls, and adjoining this are the bucking and engine rooms. In the office building are located the general office of the company, the laboratory and assay rooms.

Water is supplied from three artesian wells, the depth varying from 50 to 200 feet, any one of which is capable of supplying 200 gallons of water per minute. The water is pumped to a 40,000-gallon tank, 40 feet above the ground. The plant is equipped for fire protection and is lighted by electricity.

This is a matte-producing plant, and later there will be added converters for the production of the metal. At present the product will be shipped East. F. F. Sharpless is general manager of the company, H. B. Nichols is superintendent of the smelter and William Davidson superintendent of the mine. Prac-



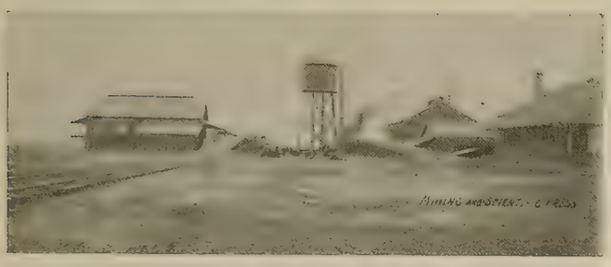
Furnace Building, California Copper Co., Madera, Cal.



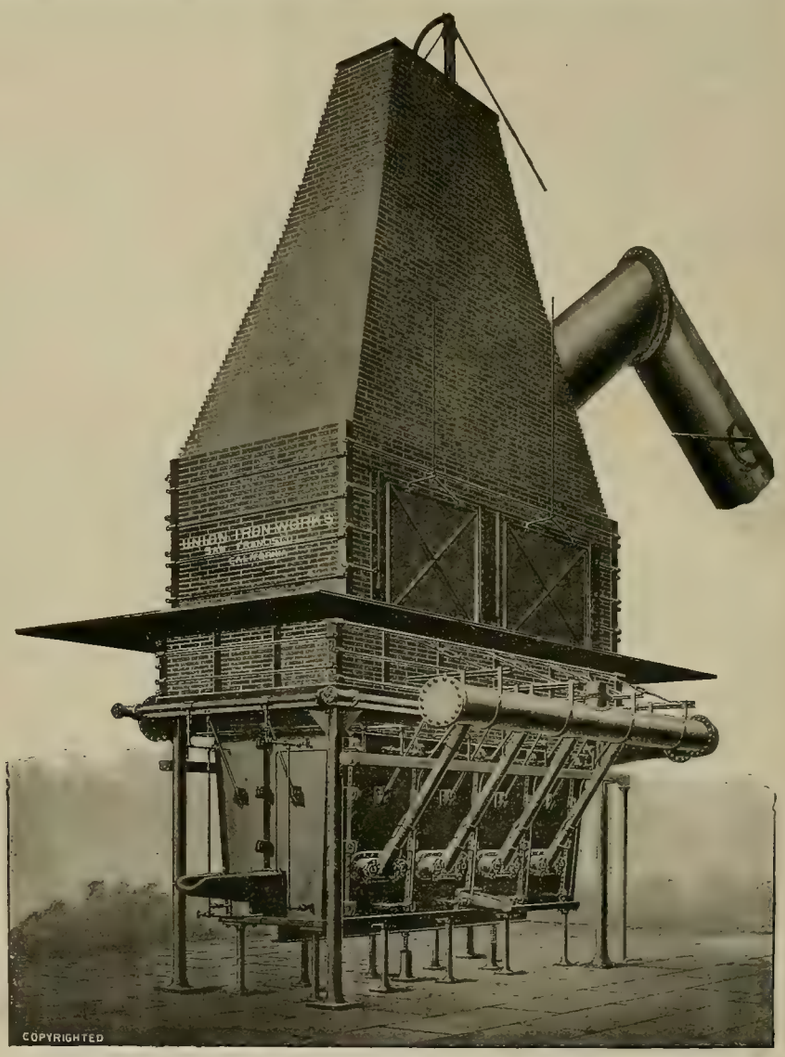
No. 1 Hoist and Gravity Tram, Daulton, Cal.



No. 2 Hoist at Daulton, Cal.



General View Smelting Plant, Madera, Cal.



Smelter, California Copper Co., Madera, Cal.

tically, all Western copper is reduced from matte obtained in the treatment of sulphide ores, and the process is of commercial importance. For a general understanding of the subject, commercial copper matte may be regarded as a mixture of subsulphide of copper with monosulphide of iron, the composition being varied by the entrance of other metals when they occur in the ores. This matte is produced by smelting together calculated quantities of oxidized and sulphide ores of copper and iron, limestone and silica. When oxidized ores are not available from the mines, the sulphide ores are partially oxidized by roasting—sufficient for the reaction in the furnace.

Occasionally an ore will approximate in its composition that of the charge in a furnace, when it is termed "self-fluxing."

The process of matte making is also of utility in concentrating gold and silver, which may be, and generally is, associated with the ores under treatment. These are subsequently recovered in the electrolytic process of refining the copper. Previous to this operation the matte has undergone "bessemerizing," an application of the Bessemer steel process to copper production.

The first converters in the United States for the treatment of copper mattes were erected for the Parrot Silver & Copper Co. at Butte, Mont. In them the matte is "blown" to metallic copper, the sulphur, iron, etc., being oxidized and slagged off. The tendency of modern practise is to make low-grade mattes—45% to 50% copper—for bessemerizing.

California State Mining Bureau Museum.

"Have you in San Francisco any exhibit or large collections of minerals, ores, etc., from which I can get an intelligent idea of California's mining resources?" is the substance of a question so often asked this paper personally and by letter, that an illustrated description of the museum of the California State Mining Bureau is in order. It has been a prominent part of San Francisco's show places for nearly twenty years; but this is an age of advertising, and the existence of anything however deserving that is not given widespread public notice is overlooked.

At the solicitation of this paper, Mr. H. S. Durden, the curator of the museum and long-time custodian thereof, has prepared the following:

In the Act of the Legislature creating the Bureau and defining the scope of its operations and the duties of the State Mineralogist, in effect in April, 1880, it was provided that the said official should "collect and preserve for study and reference specimens of all the geological and mineralogical substances found in this State, especially those possessing economic or commercial value;" also, those from all other States and countries which he could procure, which collections should be at all reasonable hours open to public inspection and study.

The Bureau obtained temporary quarters at 313 Pine St., San Francisco, and issued a circular, widely distributed, setting forth the objects of the institution and soliciting contributions of specimens.

The first and largest donation came from the California State Geological Society, which turned over their entire collection of 1327 specimens as a nucleus for the new museum.

There were also several boxes of specimens which had been exhibited at the Paris Exposition of 1878, and subsequently returned to San Francisco, which also came into the possession of the Bureau.

From this modest beginning the museum has steadily grown to its present size, largely by donations from individuals, and also by exchanges with other similar institutions, and by specimens collected by the attaches and employes of the Bureau.

A few minerals, not obtainable in any other way, have been purchased from time to time, when the funds of the Bureau permitted.

From 313 Pine St. the Bureau moved to 212 Sutter St. in June, 1881, where it remained until December, 1885, when it was removed to the Pioneer Building, on Fourth St., San Francisco.

In this building the museum occupied the entire top floor—a much larger space than had ever before been occupied by it. A number of new showcases were purchased and installed, which were rapidly filled up with specimens, chiefly from our own State. After the lapse of three years a gallery was built around part of the room, which afforded space for thirty cases, besides shelving on the walls.

As the collections continued to increase, room was made by taking out exhibits not strictly in line with the purposes of the Bureau, such as birds, animals and curios generally, and substituting therefor rocks, ores and minerals, and this process of substitution was continued until the end of 1898, when preparations were made to remove the Bureau to its present quarters, which was accomplished in January, 1899.

The museum now occupies the northern portion of what is known as the mezzanine floor of the Union Depot & Ferry House, at the foot of Market St., San Francisco, over the postoffice (Station D), access thereto being through the "grand nave."

The room is about 225 feet in length and 28 feet wide, in addition to which a number of miscellaneous exhibits are placed in the hallways and corridors adjoining.

The main room is occupied by two double rows and two single rows of showcases, extending the entire length of the room, part of the single rows on each side of the room being upright cases 8 feet high, with shelves for the large and heavy specimens which could not be put in the flat cases, or for special exhibits of rocks and marbles. (See illustration on front page).

The westerly double row of cases and some additional ones on the end and at the side are taken up by the ores of California, arranged as follows: First, gold quartz by counties, alphabetically arranged, beginning with Alpine and Amador and ending with Ventura and Yuba, and where there are large and important districts their ores are grouped together. For instance, the quartz from Angels Camp and vicinity, from Grass Valley and Nevada City, will be found together, and not scattered through the entire county exhibit. The gold quartz occupies the first thirty-two cases, then follow five cases silver ores, three cases copper ores, four cases quicksilver ores, and six cases of chrome, manganese, antimony, iron, zinc and lead ores, all arranged by counties, alphabetically. The upright cases on this side contain the large specimens of gold quartz, silver, copper, iron ores, etc., following the same general arrangement, the last three being devoted to samples of building stones found in this State.

In the window spaces are flat cases with ores from Africa, Alaska, Arizona, Colorado and other States and countries.

The easterly double row of cases contain the "mineral collections," i. e., choice and typical specimens of the various minerals, largely from California, but including specimens from all over the world. These are arranged in groups according to their mineral character, without any reference to the locality where found. Each group is arranged on the same system. For instance, the iron minerals begin with the native metal, then the various oxides, the silicates, sulphides, arsenates, sulphates, phosphates, chromates and carbonates in the order named. Passing on to the copper group, it will be found arranged on the same system, and so on through the list. Thus anyone, once aware of this method, can readily find the mineral he is searching for, especially as a chart of the cases is hung in front of a window just inside the entrance to the museum room. This division occupies thirty-four cases, the remainder of the row being used for the economic minerals, as clays, sulphur, soda, borax, salt, etc., and coals, lignites and hydrocarbons generally, principally from the Pacific coast. The side cases in the window spaces are occupied by specimens of California marbles, fossils illustrating the geology of the State, largely from the petroleum regions, ores from Mexico, Australasia, Canada, etc., tin ores and sundries. The upright cases between the windows are occupied principally by type specimens of California rocks, except two, which contain polished marbles from Eastern States and foreign countries.

At the southerly end of the cases containing gold quartz from California is a special case in which are displayed a number of choice specimens of gold in quartz, placer gold, platinum, tellurides of gold, diamonds, sapphires, etc.; and opposite is a case used for the temporary storage of new specimens as they are received. The method of arrangement of the various divisions of the museum is the result of experience gained by many years of attention to the inquiries of visitors, and is designed to accommodate the largest number, for while some people would like to see all the products of their county bunched together it is a fact that a much larger number come to examine a certain class of ores or economic minerals; hence it is better that each metal or mineral should be grouped together in one or more cases, instead of being scattered through fifty-seven groups, as would be the case if all ores and minerals from any one county were placed together.

Besides the classified collections already mentioned there are a number of special exhibits, such as models of mines and mine timbering, appliances used in mining, ethnological and historical relics, Indian stone implements, arrow points and curios generally.

On the walls are views of mines and mining operations, views of petroleum districts, maps, etc. One unique set of views, taken in 1852, showing early methods of placer mining, is especially worthy of mention, and in contrast is a set of views of modern hydraulic mining on a large scale.

But the reader may ask, "What is the use of this collection?" Its uses are various. The merchant or manufacturer visits it to ascertain where the material he wants is found, and at the same time he sees a sample from which he is able to judge if the material from any given locality is suitable for his purpose.

The miner or prospector comes to learn the appearance or physical characteristics of ores and minerals he is not familiar with, to educate his eye and acquire information in regard thereto.

The student of mineralogy visits it for similar reasons, and many of them spend days in succession examining the specimens and making notes for future use.

The capitalist and intending investor visits it to examine the ores of the county or district in which he contemplates operating, and instances are not wanting where the good showing made by some district or locality has induced the investment of capital to open up new mines or reopen old ones. Consequently it is to the interest of all sections of the State to contribute examples of their mineral products to the museum. And, lastly, it is one of the regular and permanent attractions the city offers to visitors, and it is by no means rare to hear people say that one of their principal reasons for coming to the city was to see this collection, or that they had stayed over another day for that express purpose. The museum is nominally open from 9 A. M. to 5 P. M., but many visitors arrive as early as 8 A. M. All are welcome, and any information in our power to give is cheerfully furnished; and the steady increase in the number of visitors shows that the museum is appreciated by those acquainted with it. H. S. DURDEN.

The Hunting Savage.

Under the title "The Evolution of Simple Societies," A. C. Haddon in the February issue of Knowledge says: "History is not concerned—or should not be—merely with the rise, progress, and downfall of dynasties and with the doings of great men, but it takes into cognizance the evolution of the people in general. The population of any country is not an incoherent mass, but is composed of groups, and it is the business of sociology to study the origin and history of these groups, which are subsequently welded into nations. Sociology is partly the study of the raw material of history as it endeavors to account for the idiosyncrasies of societies and groups of men whose ultimate fate is described by history." Describing the races accustomed to the chase, he continues: "Hunting is suited to the generality of men, for it is interesting, and it calls forth intelligence and the satisfaction of outwitting animals; it gratifies the lust of killing, and supplies an exciting element of chance, which keeps hope alive through disappointments The food is stimulating and enjoyable. No preparatory work or thought is required to provide the supply of food. These conditions appeal to the majority of mankind. * * * The hunting savage is naturally improvident. His true property consists in his skill and agility, which he can neither sell nor bequeath. The grave question of the transmission of property does not exist for him. No tie binds, even materially, the generations with one another to induce solidarity. Individualism triumphs. The family cannot retain its members at home; all the children successively separate as soon as they can provide for themselves. The family periodically dissolves, scattering to found new homes as instable as the preceding. Such are the characteristic traits of the instable family, which develop the spirit of change. * * * The chief of these small families forget the memory of their elders, and take no pains to transmit the remembrance of the great actions of the race to their descendants. Verbal history, so prolix in sedentary communities, is almost non-existent among nomadic hunters. Magical practises may be developed, but true religion—that is, the worship of a spirit or spirits—is in a very primitive stage. Among the South American hunters not only is there no respect for their progenitors, but they may abandon and even eat their parents. The instable family often leaves orphans, the sick, the aged—in other words, the feeble and incapable—without refuge and sustenance; there is no fixed home to act as a place of refuge."

Table Showing Capacity Lost by Air Compressors Operating at Various Altitudes Above Sea Level.

Altitude above sea level, ft.	Barometer, inches.	Efficiency of compressor, %.	Loss, %.
0	30	100	0.
500	29.42	98.4	1.6
1,000	28.85	96.9	3.1
1,500	28.34	95.5	4.5
2,000	27.78	94.	6.
3,000	26.74	91.1	8.9
4,000	25.70	88.1	11.9
5,000	24.73	85.9	14.1
6,000	23.83	82.8	17.2
7,000	22.93	80.2	19.8
8,000	22.04	77.5	22.5
9,000	21.22	75.1	24.9
10,000	20.43	72.7	27.3

Cutting Drill Steel.

TO THE EDITOR:—For the benefit of miners and readers of the MINING AND SCIENTIFIC PRESS, I give my way of cutting drill steel for drills, etc. I use an old stamp mill die to cut on. On the bottom of the die there is a depression about 1″x3″x⅛″ deep. It requires only two blows with a blacksmith's sledge and cold chisel with handle. Cut the first lick on the smooth face of the die, and the second over the depression and opposite the first cut, the steel lying lengthwise with the depression, and it will break and fly like glass. Any large piece of heavy iron could be thus prepared for the purpose.

Hornbrook, Cal.

Note on the Plate Amalgamation of Gold and Silver.*

By E. A. H. TAYS, San Jose de Gracia, Sinaloa, Mexico.

As I promised, in a former paper on the Bryan mill, to give further data regarding the plates from four battery aprons, I now submit the following:

These aprons were 4.5 feet wide by 16 feet long; the first two plates of each apron were 4.5x4.5 feet, and the remainder of varying sizes, as can be seen by their relative weights, as shown in the table; but all were 54 inches wide. They were in use four years and nine months, and about 15,265 tons of ore passed over each. The ore was quartz, carrying about the same weight in silver as in gold; showing some copper, and highly impregnated with ferric oxide. The tailings show about 0.6% and the bullion about 10% of copper. The silver was present mostly as sulphide; and the copper was also present as sulphide, with some carbonate.

The ore treated in 1898 was a fair average of the whole run; so I take it as an example from which to make a few deductions.

	Gold. Ozs.	Silver. Ozs.
The ore assayed, per ton	0.76	0.71
The tailings, per ton	0.22	0.44
Amount extracted, per ton	0.54	0.27
Extraction, per cent	71.1	39.4

From the above we see that the ratio by weight of gold to silver in the bullion produced, as per assays, should be 2 to 1.

The average fineness of the bullion produced during the same period was: Gold, 658.80; silver, 240.80; showing a ratio of 2.74 to 1.

From the annexed table it will be seen that the several ratios on the apron are:

Apron.	Gold.	Silver.
1	2.58	to 1
2	2.65	to 1
3	2.61	to 1
4	2.58	to 1

One apron, No. 4, shows a regular gradual decline in value from top to bottom; all the rest show varying values, though the top plate is always richer than those below it. Apron No. 1 is very irregular in the relative values of the successive plates.

All of these aprons would have given much more bullion; but in 1897 plates Nos. 1 and 2 of each apron were scraped very close with steel chisels, and at least $10,000 in gold was taken from each apron. But no special and exact record was made of the amount at the time.

In this case it is seen that, although the assays of the ore treated call for a ratio of 2 gold to 1 silver in the bullion, the actual ratio of the bullion produced was 2.74 to 1. The approximate average of the bullion recovered from the plates, when these were melted into bars, so as to make a fair average of the entire product, is 2.605 to 1; which shows but a slight variation from the bullion itself.

Over the Bryan mill plates, already referred to, there passed about 24,440 tons of ore; and the bullion obtained from these shows a ratio of 2.31 gold to 1 silver, which is somewhat nearer the assay ratio of 2 to 1.

From the above data we are led to infer that where all values contained in the plates are obtained together, all bullion, whatever its source, will have about the same ratio, and that the silver which is in it fit form for amalgamation is just as amenable to it as the gold, showing no greater—or but little greater—tendency to resist amalgamation at the top than at the bottom of an apron. It is probable, however, that much depends, in this regard, on the nature of the ore treated.

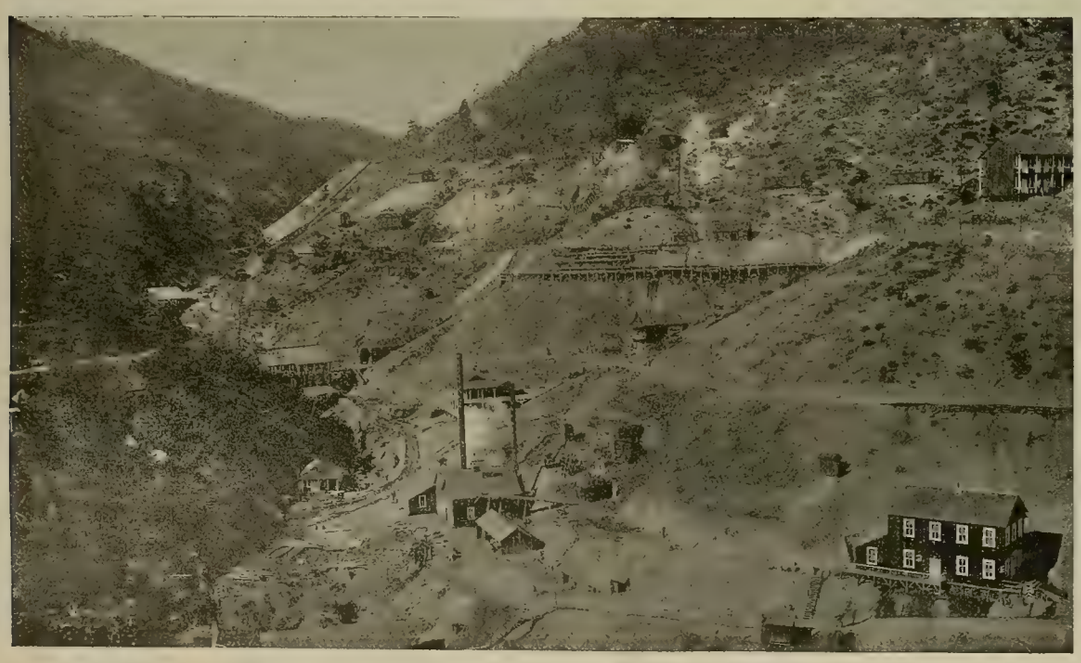
*Transactions of the American Institute of Mining Engineers, Washington meeting, February, 1900.

TABLE SHOWING VALUES OF MILL APRONS REMOVED AFTER A RUN OF FOUR YEARS AND NINE MONTHS.

Plate.	Weight, oz. troy.	FINENESS IN Gold.	FINENESS IN Silver.	OUNCES FINE Gold.	OUNCES FINE Silver.	Total value.
Apron No. I. 1	1341.7715	92.00	38.70	123.443	51.927	$2582 73
2	1250.989	37.15	14.25	46.474	17.827	971 32
3	1177.444	40.40	14.35	47.569	16.896	993 39
4	662.9875	70.40	26.70	46.674	17.702	975 37
5	1060.400	48.60	17.35	51.535	18.398	1076 27
	Ratio,	2.58 to	1			$6599 08
Apron No. II. 1	1312.0245	52.90	22.00	69.406	28.865	$1451 94
2	1202.279	37.80	13.60	45.446	16.351	949 18
3	756.1875	46.65	16.15	35.276	12.212	736 48
4	785.075	63.40	22.70	49.774	17.821	1039 52
5	771.600	47.30	17.95	36.497	13.850	762 70
6	853.0375	48.80	19.05	41.628	16.250	870 20
	Ratio,	2.65 to	1			$5810 02
Apron No. III. 1	1210.9933	93.10	37.55	112.743	45.473	$2357 68
2	1719.0192	73.30	28.35	126.004	48.734	2633 74
3	775.4875	75.30	27.45	58.394	21.287	1219 77
4	619.125	34.05	10.50	21.081	6.500	439 64
5	680.125	47.65	17.85	32.408	12.140	677 15
6	825.200	47.50	19.90	39 197	16.421	820 05
	Ratio,	2.61 to	1			$8148 03
Apron No. IV. 1	1155.000	78.20	34.10	90.321	39.386	$1890 57
2	1144.075	66.90	24.20	76.539	27.687	1598 67
3	983.200	47.65	17.75	46.849	17.452	978 84
4	1072.1625	36.75	13.75	39.402	14.742	823 29
5	893.2375	34.30	12.10	30.637	10.808	639 75
	Ratio,	2.58 to	1			$5931 12

Cave at a California Copper Mine.

On the 1st inst. a caving in the copper level of the Iron Mountain mine, fourteen miles from Redding, Cal., entombed eight miners, five of whom were got out by the rescuing party that was immediately put to work. The accompanying engraving illustrates the scene of the accident—the Iron Mountain mine, owned by the Mountain Copper Co.—where (including the smelter at Keswick and kindred operations) nearly 1000 men are employed. Insecurity and inadequate timbering are cited by miners as the cause of the caving. In rescuing the five men they were got out by an improvised hoist through ore chutes to the rock drift above the copper level. All of the five men taken out died soon after and it is thought that the others are dead.



Iron Mountain Mine, Shasta County, Cal., the Scene of This Week's Disaster.

(Entrance to the level where the cave occurred is seen to the right, half way up the gulch.)

Another Arizona Compliment.

The MINING AND SCIENTIFIC PRESS is the foremost mining journal not only in America, but, as far as our own knowledge goes, in the world.—Kingman Miner, Feb. 24.

The Buried Alps.

It is now well recognized that the granitic core of a great mountain chain is not in itself the cause of the elevated highland, so says Prof. Cole in the current number of Knowledge. It has not forced itself up, splitting asunder the superincumbent strata, and hurling them back on either hand; but it bears in its own structure all the signs of stress and pressure, and has clearly been elevated with the strata, along some line of wrinkling in the crust. Here and there, remelting has gone on in the core, as the old rocks moved upward from Precambrian resting places; at other places fresh molten masses have intruded from some caldron far below. Along the axis of movement, the old crust has been squeezed together like a sponge; the liquids have escaped from one hollow to another, and at last consolidated as crystalline igneous rocks, destined to weather out in resisting peaks and pinnacles. The great arch, as it rose, became the natural receptacle for most of these flowing masses; hence when denudation worked against the chain, these reconstituted types of the fundamental rocks—ancient gneisses that had renewed their youth, began to stand out pre-eminently as a great central ridge. The stratified covering was swept from them, and is now found only in the foothills, where its very structure, consisting of folded layers, still renders it an easy prey. Rain and frost work in along the upturned bedding planes; and the strained masses are always ready to slip and settle down before the earth tremors that still attack the chain. The central core, then, marks out the axial character of the mountains, where, on the other hand, it has not been pushed sufficiently towards the surface; the features of the foothills may prevail from side to side of the wrinkled area. Thus it is that, as we approach the end of the chain, the scenery is less austere, and more broken up into local landscapes—not so generalized as in the grander altitudes of the range. This becomes markedly felt in the eastern borders of the Alps, where the hills ramify like huge fingers, grasping between them the inlets of the European plain. At times we scarcely realize the presence of the massif, the potential mountain range, though all the time it lies buried at no great depth beneath us. Describing the shelterless alluvian plains, the Professor says: Up in the Alps you may crouch beneath a rock and see the lightning leap from scar to scar, and hear the church bells ringing out their answer from the fields a thousand feet below; but here, in the great open, the elemental forces will hold you more securely in their grasp. A hand, as it were, at first gentle, then imperious, pushes you forward from behind. In the air there are resistless spirits; in the oak forest there are strange whisperings and the cry of frightened birds. The herd boy, with his rustic pipe, knows these things better than the wisest student of geography.

An Appreciated Compliment.

The MINING AND SCIENTIFIC PRESS, published at San Francisco, is to-day the leading mining journal of the world. Portions of its contents, whether editorial, by scientific writers, or pertaining to mines and their development, are copied throughout the United States by journals of various denominations. It is always replete with newsy paragraphs, bright editorials and reliable information to miner, mine owner, manufacturers of mining machinery and the capitalist in general.—Jerome, Arizona, Mining News, Feb. 19.

D. TOMMASI, an Italian inventor, has produced a cartridge for mining and blasting purposes inexplosive until its contents are electrolyzed by the passage of a current. The cartridge is a stout glass tube, contains a platinum wire sealed at each end, and is filled with a concentrated solution of ammonium chloride, which, when electrolyzed by the passage of a current through it, decomposes into chlorine, ammonia and hydrogen. The chlorine reacts upon the ammonia and decomposes it, forming hydrochloric acid and chloride of nitrogen. When the gases thus disengaged attain sufficient pressure, the tube bursts, the resulting shock detonating the chloride of nitrogen.

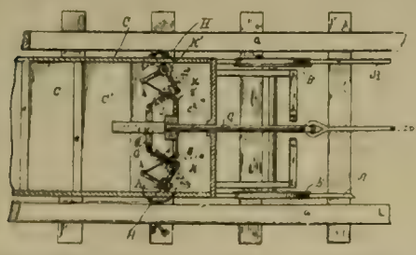
A NEW use for refrigerating machinery has been found in the contemplated cooling of magazines of warships so as to prevent explosion danger from overheating. Experiments with that end in view have been made for some time; but it is only recently, with plans proposed by Rear-Admiral O'Neil of the United States Navy, that any fair measure of success is said to have been attained. It does not seem unlikely that in vessels yet to be built magazine refrigerating apparatus will be one additional adjunct to the list of marine auxiliary machinery.—Cassier's.

Latest Mining and Metallurgical Patents.

Patents Issued Feb. 20, 1900.

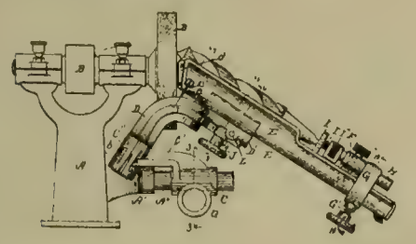
Spec'ally Reported for the MINING AND SCIENTIFIC PRESS.

MINE ELEVATING APPARATUS. — No. 643,674; J. Muirhead, Laurium, Mich.



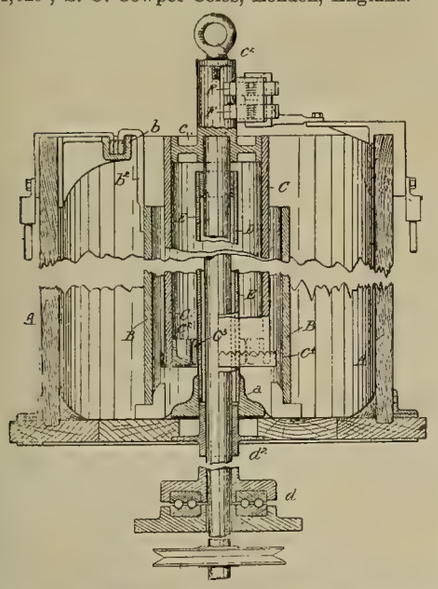
Combination with mine shaft; a car movable up and down shaft; draw-head carried by car and arranged longitudinally of the shaft; car-propelling cable operatively connected with draw-head; beam arranged longitudinally of the shaft, out of the way of the path of the car; a cam-shaped brake, having serrated face provided with several pointed teeth projecting beyond serrations, supported from car and arranged as required to render it capable of biting or clutching the beam upon oscillating it in one direction; two arms rigid with cam-shaped brake, and projecting laterally from axis of brake arranged at right angles to each other; a link operatively connecting one of the arms with draw-head; and a spring connected at one end to the other arm, and having its opposite end attached to the car.

DRILL GRINDING MACHINE.—No. 643,703; H. P. White, Kalamazoo, Mich.



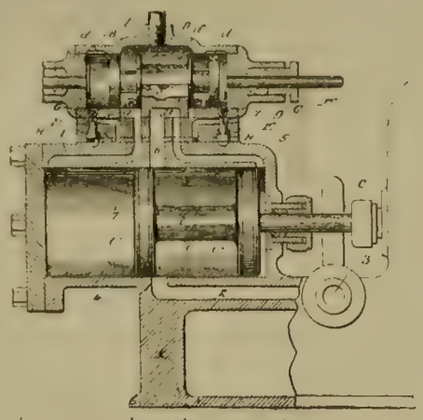
Combination of base A, carrying suitable grinding wheel B′; a cylindrical arm A″ extending parallel to axis of grinding wheel; a bracket C′ adjustably supported on arm A″; an arm D with a journal standing at an angle to the face of grinding wheel, extending into a journal-bearing box C″ back of face of grinding wheel and extending upwardly and then downwardly in front of grinding wheel; a V-shaped drill holder E rounded on its under side at E′ and resting on a curved bearing D′ on the arm D; a hand screw J extending upwardly through a transverse slot J″ in the bearing portion D′ and connecting by a screw thread with under side of drill holder to clamp same when adjusted in its support; an adjustable tail block or stock for drill holder and a drill lip rest secured to forward end of same.

PROCESS OF ELECTRODEPOSITION OF METALS.—No. 644,029; S. O. Cowper-Coles, London, England.



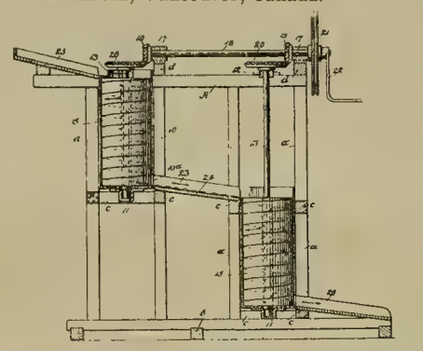
In electrodeposition of metals, process consisting in passing electric current from anode to cathode through electrolyte containing metal to be deposited, at such time moving cathode through electrolyte at such rate of speed as will cause hydrogen bubbles to be thrown off from cathode and give such friction between metal deposit on cathode and electrolyte as to yield tough and smooth deposits; rotating cathode at a speed approximating 1000 feet per minute.

STEAM PUMPING ENGINE. — No. 643,732; B. O. Rhodes, Harvey, Ill.



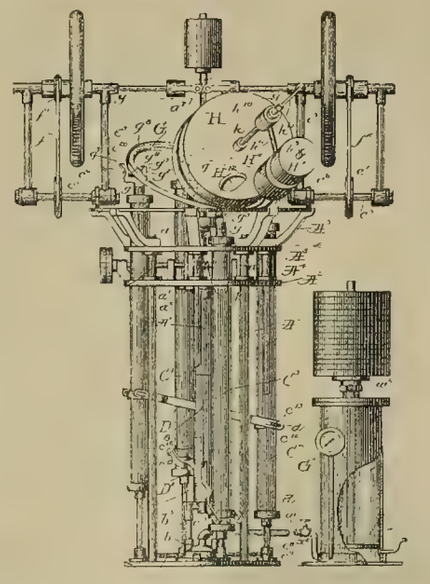
A steam pump in which the exhaust can be employed to heat the water, and in combination with a cylinder, steam chest, piston and steam actuated reversing valve, a ported deck plate arranged between the cylinder and steam chest and provided with steam actuated valve devices for controlling the admission and exhaust of steam to and from the reversing valve, each steam actuated valve device consisting of a check valve and an actuating plug for lifting such check valve.

AMALGAMATOR.—No. 644,009; C. G. Garrison and J. A. Fitzsimmons, Vancouver, Canada.



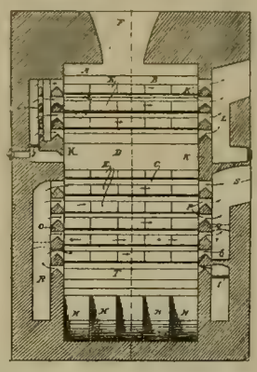
The combination with cylindrical casing 10, opening at top and having an outlet at bottom, of shaft projected vertically through casing; means for rotating shaft; series of spiral segments having amalgamating surfaces, detachably connected to shaft and rotative therewith, and adapted to be independently removed from shaft, each section having an upturned outer edge of depth of pitch of spiral formed thereby, whereby segments are disposed in successive engagement to constitute a continuous spiral chute or runway, outer edges of sections traveling contiguous to inner surface of casing, whereby water and auriferous material is held from contact with casing and caused to continuously flow through chute or runway and finally escape through outlet at bottom of casing.

AIR COMPRESSOR.—No. 643,918; K. O. B. Textorius, Boston, Mass.



A main frame comprising a base plate, upright standards, and a head carried by the latter, a receiving chamber on the base plate, a series of compressors radially arranged about chamber, each compressor including a cylinder and a valved piston therein, a fixed, hollow piston rod therefor communicating with receiving chamber, a vertically movable cylinder having an inlet valve, a rocking arm mounted on fixed pivot and connecting cylinders of opposite compressors, a series of bifurcated members connected to upper ends of cylinders, provided with supporting devices between branches thereof, a gyratory, annular track adapted to rest upon supporting devices, an actuator adapted to roll upon track, means to move actuator bodily in a substantially horizontal, circular path, whereby weight of actuator will operate to depress cylinders one after another, and means to retain upper portion of track in place.

QUICKSILVER FURNACE.—No. 643,839; H. C. Davey, Calistoga, Cal.



A quicksilver furnace with inner and outer walls, the former having passages or openings through them, superposed roasting and drying chambers between inner walls and connecting so that material will flow from one chamber to the other by gravitation, a fireplace and discharge flue for each chamber between inner and outer walls, with fireplace and discharge flue of one chamber separate and independent of fireplace and flue of other chamber, and means for supplying ore at top of one chamber and discharging it at bottom of other chamber.

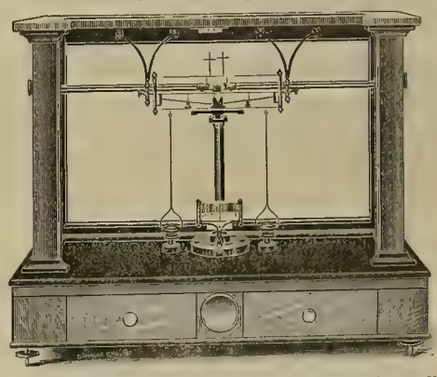
A New Precision Balance.

The accompanying illustration is of a new precision balance with 5-inch beam recently placed upon the market by Wm. Ainsworth & Sons, balance makers of Denver, Colo., U. S. A.

The counterpoised sliding door has been removed to better illustrate the instrument.

This balance is of late approved construction, with "fall-away" pan rests and yokes having agate contacts throughout, there being no metal contact points with the beam or hangers.

A plate glass sub-base covers the entire base and all metal work is gold plated. The base is of mahogany, French polished, with two drawers in the base and counterpoised sliding door.



The beam, which is made of a new palladium alloy having a tensile strength of from 80,000 to 90,000 pounds, is divided into fifty parts—each side of the center for the use of a half milligramme or one milligramme rider—and there being no obstruction on the top, the rider may be placed at any point from the center to the last division on either end.

Cylindrical reading glasses are provided for reading the beam and index, and the latest improved rider apparatus with rod locks is furnished.

This balance has been designed for especially accurate weighings, such as "control" and "umpire" assays and for the most accurate work in scientific and chemical laboratories, balances of this general construction having been furnished sensitive to $\frac{1}{10000}$ milligramme.

THERE is for every substance some point of temperature above which it cannot become liquid; this is called the "critical temperature."

Masonry Dams and Retaining Walls.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE T. PARDOE.

SECTION V.

Height of center of pressure $= \frac{28}{3} = 9.3$ feet.

Total water thrust $= 62.5 \times 15.5 \times 25 = 24218$ lbs.
Thickness at top $= 11.3$; thickness at bottom $= 14.3$ feet.
Weight of section V $= 10560$ lbs.; total weight $= 52840$.

Tangent of angle of resultant $= \frac{24218}{52840} = 0.458$.

Deviation of resultant from C. of G. $= 0.458 \times 9.3 = 4.2$.
Distance between centers of G. $= 6.2 - 5.1 = 1.1$ feet.

C. of G. from inner face $= \frac{1}{3}\left(11.3+14.3-\frac{11.3\times14.3}{11.3+14.3}\right) = 6.2$ feet.

C. C. of G. from inner face $= 6.2 - \left(\frac{42280}{52840} \times 1.1\right) = 5.3$ feet.
C. of Res. from inner face $= 5.3 + 4.2 = 9.5$ feet.

Outer limit middle third $= \frac{14.3}{6} + 7.1 = 9.4$ feet.

Inner limit middle third $= 7.1 - \frac{14.3}{6} = 4.7$ feet.

The line of resistance therefore falls slightly outside the limit. The figures show $\frac{1}{10}$ foot, but it is really less, the slight difference being caused by working to only one place of decimals.

The error, such as it is, can be readily corrected by adding a slice to the outer face, and being of proportionately trifling weight the horizontal position of the C. of G. will be practically unaltered.

SECTION VI.

Height of C. of pressure $= \frac{33}{3} = 11.0$ feet.

Total water thrust $= 62.5 \times 18 \times 30 = 33750$ lbs.
Thickness at top $= 14.9$; thickness at bottom $= 18$ feet.

NOTE.—$\frac{1}{10}$ foot added to top outer face to correct Section V.
Step added to inside face $= 0.5$ feet.
Weight of masonry section VI $= 13571$ lbs.
Total weight all sections $= 66411$ lbs.

Tangent of angle of resultant $= \frac{33750}{66411} = 0.508$.

Deviation of resultant from C. of G. $= 11 \times 0.508 = 5.5$ feet.

C. of G. from inner face $= \frac{1}{3}\left(14.9+18.0-\frac{14.9\times18.0}{14.9+18.0}\right) = 8.3$ feet (nearly).
Distance between centers of G. $= 8.3 - (0.5 + 5.3) = 2.5$ feet.

C. C. of G. from inner face $= 8.3 - \left(\frac{52840}{66411} \times 2.5\right) = 6.4$ feet.
C. of Res. from inner face $= 6.4 + 5.5 = 11.9$ feet.

Outer limit middle third $= 9 + \frac{18}{6} = 12$ feet.

Inner limit middle third $= 9 - \frac{18}{6} = 6$ feet.

NOTE.—It will be observed how the addition of the step inside reduces the outside batter, since it acts both by increasing the base and at the same time tends to bring the C. of G. of section VI nearer to the inner face.

SECTION VII.

Height of center of pressure $= \frac{38}{3} = 12.6$ feet.

Total water thrust $= 62.5 \times 20.5 \times 35 = 44843$ lbs.
Thickness at top $= 18$ feet; thickness at bottom $= 21.5$ feet.
Weight of masonry section VII $= 16293$ lbs.
Total weight of all sections $= 82704$ lbs.

Tangent of angle of resultant $= \frac{44843}{82704} = 0.542$.

Deviation of resultant from C. of G. $= 0.542 \times 12.6 = 6.8$ feet.

C. of G. from inner face $= \frac{1}{3}\left(18 + 21.5 - \frac{18 \times 21.5}{18 + 21.5}\right) = 9.9$ feet.
Distance between centers of G. $= 9.9 - 6.4 = 3.5$ feet.

C. C. of G. $= 9.3 - \left(\frac{66411}{82704} \times 3.5\right) = 7.1$ feet.

Distance of C. of Res. from inner face $= 7.1 + 6.8 = 13.9$ feet.

Outer limit of middle third $= \frac{21.5}{2} + \frac{21.5}{6} = 14.2$ feet.

Inner limit of middle third $= \frac{21.5}{2} - \frac{21.5}{6} = 7.2$ feet.

The line of resistance is therefore within the outer limit by 0.3 feet, and outside the inner limit by 0.1 foot.

SECTION VIII.

Height of C. of pressure $= \frac{43}{3} = 14.3$ feet.

Total water thrust $= 62.5 \times 23 \times 40 = 57500$ lbs.
Thickness at top $= 21.5$ feet; thickness at bottom $= 25$ feet.
Weight of masonry section VIII $= 19181$ lbs.
Total weight of all sections $= 101885$ lbs.

Tangent of angle of resultant $= \frac{57500}{101885} = 0.564$.

Deviation of resultant from C. of G. $= 0.564 \times 14.3 = 8.06$ feet.

C. of G. from inner face $= \frac{1}{3}\left(21.5 + 25 - \frac{21.5 \times 25}{21.5 + 25}\right) = 11.6$ feet.
Distance between centers of G. $= 11.6 - 7.1 = 4.5$ feet.

Distance of C. C. of G. $= 11.6 - \left(\frac{82704}{101885} \times 4.5\right) = 8$ feet.
Distance of C. of Res. $= 8 + 8 = 16$ feet.

Distance of outer limit of middle third $= 12.5 + \frac{25}{6} = 16.1$ feet.

Distance of inner limit of middle third $= 12.5 - \frac{25}{6} = 8.4$ feet.

SECTION IX.

Height of C. of pressure $= \frac{48}{3} = 16$ feet.

Total water thrust $= 62.5 \times 22.5 \times 45 = 71718$ lbs.
Thickness at top $= 25$ feet; thickness at bottom $= 29$ feet.

NOTE.—The outer face has a batter of 3.5 feet and the inner face a batter of 0.5 feet, as indicated by a preliminary calculation.

Weight of masonry section IX $= 22275$ lbs.
Weight of masonry, all sections $= 124160$ lbs.

Tangent of angle of resultant $= \frac{71718}{124160} = 0.577$.

Deviation of resultant from C. of G. $= 0.577 \times 16 = 9.2$ feet.

Distance of C. of G. from inner face $= \frac{1}{3}\left(25 + 29 - \frac{25 \times 29}{25 + 29}\right) = 13.5$ feet.
Distance between centers of G. $= 13.5 - 8.5 = 5$ feet.

C. C. of G. from inner face $= 13.5 - \left(\frac{101885}{124160} \times 5\right) = 9.4$ feet.
C. of Res. from inner face $9.4 + 9.2 = 18.6$ feet.

Outer limit of middle third $= 14.5 + \frac{29}{6} = 19.3$ feet.

Inner limit of middle third $= 14.5 - \frac{29}{6} = 9.7$ feet.

In the above calculation for the position of the C. of G. it has been assured as a preliminary that the inner face is vertical and that the batter of outer face is 4 feet. As, however, this would (as shown above) cause the inner C. of Res. to fall beyond the limit of the middle third and at the outside to fall 1 foot within it, we will alter the outer batter to 3.5 feet, as in section VIII, and add 0.5 feet, so gained, to the inner face as a wedge-shaped piece. This practically has no effect on the horizontal position of the C. of G., while it reduces the error on the inside to a very small amount, viz., 0.2 feet.

SECTION X.

Allowing the same batter to the outside and inside as in section IX, we have in section X:

Thickness at top $= 29$ feet; thickness at bottom $= 33$ feet.

Height of C. of pressure $= \frac{53}{3} = 17.6$ feet.

Total water thrust $= 62.5 \times 28 \times 50 = 87500$ lbs.
Weight of masonry section X $= 25575$ lbs.
Weight of masonry, all sections $= 149735$ lbs.

Tangent of angle of resultant $= \frac{87500}{149735} = 0.584$.

Deviation of resultant from C. of G. $= 0.584 \times 17.6 = 10.2$ feet.

Distance of C. of G. from inner face $= \frac{1}{3}\left(29 + 33 - \frac{29 \times 33}{29 + 33}\right) = 15.5$ feet.
Distance between centers of G. $= 15.5 - 9.4 + 0.5 = 5.6$ feet.

Distance of C. C. of G. from inner face $= 15.5 - \left(\frac{124160}{149735} \times 5.6\right) = 10.9$ feet.

Distance of C. of Res. from inner face $= 10.9 + 10.2 = 21.1$ feet.

Outer limit middle third $= 16.5 + \frac{33}{6} = 22$ feet.

Inner limit middle third $= 16.5 - \frac{33}{6} = 11$ feet.

We have again assumed a vertical inner face and an outside batter of 4 feet, and now correcting this we have an outside batter of 3.5 feet and an inside batter of 0.5 feet.

The slice added to the inside face evidently leaves an error of 0.2 feet, as in section IX, and a margin of safety on the outside of 1 foot.

The effect of the error on the inside is to cause tension on the outer face, but to a very small extent, and, as shown previously, the greatest danger is caused by a tension on the water face, the dangerous results of tension (and liability to fissuring) on which face has been already pointed out.

It is only fair, however, to remark that more than one dam is standing (and has done for many years) in which a considerable tension exists on the inner face when the dam is full.

For practical reasons concerning durability it is desirable that no tension should exist at all under any circumstances, and it will therefore be preferable to amend our calculated profile by adding small slices to inside and outside to correct the errors shown and at the same time to make the batters uniform or curved for the sake of appearance.

(TO BE CONTINUED.)

Chemistry of the Sun's Atmosphere.

Of all the heavenly bodies open to our inquiries, says A. Fowler in Knowledge, the sun is the one which can be best submitted to the processes of spectrum analysis; in the first place, because its light is so brilliant that instruments of great power can be utilized, and, in the second place, because it is near enough to admit of its component parts being separately observed. * * * Our terrestrial chemistry is but skin deep, and our solar chemistry is only that of the sun's atmosphere, for we as yet know nothing either of the interior of the earth or of the vast region which lies beneath the sun's photosphere. It must be borne in mind, also, that as regards the sun our knowledge is limited to the indications of the spectrum, which, in the case of a mixture of substances, may render no account of some of the elements present. Thus, although we are not yet in a position to assert that the composition of the sun is identical with that of the earth, it would not be easy to justify the view that there is any fundamental difference. * * * In the present state of our knowledge it does not seem possible to give a perfectly trustworthy list of the elements certainly present in the sun. One published by Rowland, in 1891, is the most extensive, but the more recently published tables do not seem to afford complete justification for it. Taking the tables, however, and including oxygen, gallium and the chromospheric and coronal gases, we may summarize the most probable elements as follows:

Aluminum	Hydrogen	Potassium
Asterium	Helium	Scandium
Barium	Iron	Silicon
Cadmium	Lanthanum	Silver
Calcium	Magnesium	Sodium
Carbon	Manganese	Strontium
Cerium	Molybdenum	Titanium
Cobalt	Neodymium	Vanadium
Copper	Nickel	Yttrium
Cronium	Oxygen	Zinc
Chromium	Palladium	Zirconium

In addition there is evidence which suggests the possible presence of the following elements:

Beryllium	Mercury	Ruthenium
Didymium	Niobium	Thallium
Erbium	Platinum	Tin
Indium	Rhodium	Tungsten
Lead		

Besides these, Rowland, in his 1891 list, includes germanium and glucinum among the elements present, and iridium, osmium, tantalum, thorium and uranium among those doubtfully present, while Lockyer concluded that lead and uranium were certainly present, and lithium, glucinum, rubidium, cæsium and bismuth probably present.

Cars Painted in Ten Minutes.

A number of American railways now paint all their cars by machinery, and the apparatus used is very curious and interesting. The paint is first mixed to about the consistency of cream and then poured into a small steel tank connected with a reservoir containing compressed air. When the valve is opened the stuff is forced up into a flexible tube about as big around as a man's thumb, and comes out of a brass nozzle in the form of a fan spray, thin as a knife blade. All the operator has to do is to wave the nozzle to and fro, using it exactly like a brush. The spray at the top is not more than an inch broad, so if he wants a narrow stroke he has merely to bring it near, and vice versa for a wide one. It is claimed that the apparatus deposits a paint film of exactly the same thickness throughout, which is, of course, impossible to do with a brush, and that its work is consequently more durable and a better protection from the weather. Be that as it may, there is no denying its superior speed. The rapidity with which painters using compressed air work is marvellous. They stand on movable platforms, which are pulled forward and back before the cars, and they literally paint them on the run. The time occupied for each averages about fifteen minutes, and the men claim that they can even do an entire car in ten at a pinch.—American Exporter.

MINING SUMMARY.

ALASKA.

Cape Nome sands are reported running $100 a ton, and sample $40.60 at the San Francisco mint.

The rush to Cape Nome has begun. Eight sailing vessels and several more steamers leave San Francisco next month. The demand for accommodations continues, and many thousands will doubtless go there this season.

The Government has decided to establish a winter overland United States mail route from the Cook inlet coast to Nome. To this end it is dispatching an expedition to travel over the Katmai trail and report on its practicability for mail-carrying purposes.

ARIZONA.

GRAHAM COUNTY.

The new concentrator of the D. C. Co. at the Yankee mine has made its first run. The large gas engines give satisfaction. It is the largest and most complete concentrator in that country. At the smelters the dust flue and smokestack have been connected and the sulphur fumes are carried over the hills.

MOJAVE COUNTY.

Miner: The strike in the Lucky Boy is all the talk in Chloride. The crosscut tapped 6 feet of ore that will average nearly $300 in gold and silver.

PIMA COUNTY.

At the Mammoth-Collins mine and mill and Aravapai plant Gen. Mgr. Blair has seventy stamps, which begin pounding next week. A 40 H. P. gasoline engine is in operation. The two cyaniding plants are operating on tailings, treating 500 tons daily.

YAVAPAI COUNTY.

(Special Correspondence).—The copper camp of Jerome is connected with the Santa Fe, Phœnix & Prescott Railway by a railway twenty-six miles long. Heretofore when written about, Jerome has been associated with the United Verde mine and its owner, Senator Clark of Montana, and nothing else. That the United Verde mine is one of the greatest copper deposits in the world goes without saying, and yet the air of mystery surrounding it is so great that writers have drawn upon their imaginations concerning its actual value and its output, both of which have been exaggerated. It is a close corporation and little data is furnished by its managers. What is true about it is that the company has for the past few years paid dividends at the rate of $3,000,000 per year. What has actually been earned is a problem which Prof. Treadwell, one of the minority stockholders, is now trying to solve in the New York courts.

Herewith is a summary of operations of the United Verde mine for the fiscal and calendar year of 1899:

RECEIPTS.

Sale of copper	$5,775,621
Silver	293,221
Gold	288,598
Anodes	16,719
Miscellaneous	21,708
Total	$6,395,868

EXPENDITURES.

Mine development	$ 555,147
Ore roasting	102,916
Converter expenses	1,036,191
General expenses	64,682
Freight	427,412
Depreciation	218,978
Bad debts	300
Mine prospecting	49,687
Miscellaneous	205,030
Total expenses	$2,660,346
Profit from operation	3,735,522
Total	$6,395,868
Mining profit for 1899	$3,735,522
Received from interest	89,999
Total	$3,825,521
Dividends	3,000,000
Balance	$ 825,521

Construction expenses in 1899 amounted to $801,110. The total product was 43,390,590 pounds.

The property was purchased by Senator Clark in 1888 and has been systematically developed ever since it came into his possession. The deepest shaft on the property is 700 feet. The longest tunnel is 3000 feet, which, at 1200 feet, strikes the ore body, which continues to the end, and which is reported to be 600 feet wide. Diamond drills, sunk from the bottom of the present workings, are said to have been in ore in nearly every instance. The reduction plant on the property, which is one of the most approved, has a capacity of 800 tons per day, but has never been run to its full capacity, owing to lack of water. At present the water is being used over and over again, and unless this district is soon blessed with rain or snow, the output of this property will be curtailed. The output at present is about eighty tons of metallic copper per day, better than 99% fine.

Jerome is a place of high wages and high prices for everything. The new boarding house or hotel, built by the United Verde Co., will soon be open. No transients will be entertained therein. When completed and fully furnished, $150,000 will have been expended. It is the finest miners' boarding-house in the world. It contains 200 sleeping rooms, most of which have two or three beds in them. All are carpeted and comfortably furnished. From 400 to 500 miners will be housed there in first-class shape. They will be charged $30 per month for board and $6 per month for a bed. It is four stories high, built of brick and stone. Besides the hotel, the company has constructed a fine hospital of brick and a large store.

The United Verde & Pacific Railway was built in 1895 and is a private corporation, owned by Senator Clark and some of his managers and officers. For the past year it has been running from nine to twelve trains per day, composed of eight cars to each train. The gauge is 3 feet and fifty-ton locomotives are used. After entering the mountains, there are eighty-three curves in twelve miles, running as high as 45°. The grade is 3%. There are but six-tenths of a mile of level track on the entire road. W. A. Clark is Pres., J. L. Giroux Vice-Pres. and Gen. Mgr., J. T. Wheaton Supt. and Gen. H. R. G. Minty Auditor and Gen. Pass. and Freight Agent.

The United Verde mine is not the only one in the district. The Jerome C. Co.'s property adjoining comprises 200 acres. The company was organized two years ago by Ralph Dillon, who is still Pres. and Mgr. The syndicate furnishing the money for the development of this property consists of Scotchmen of Dundee. When this company took hold of the property the greatest development was 300 feet. Active development began about a year ago, since which time $50,000 has been expended on the property. One tunnel is in over 1100 feet, gaining a vertical depth of 800 feet. Good ore has been developed. It is the intention of the company to erect a smelting plant. The company is capitalized at $4,000,000.

The Verde Queen C. M. Co.'s property, consisting of twenty-four claims, some of which lie almost within the town limits, lies under the hill below the town. Some of the claims owned by this company were located in 1896 and the remainder in 1899. Upon the Columbia they have opened a face 120 feet wide, from which one carload has been shipped to the El Paso smelter which gave returns of 26.7% copper. The company is capitalized at $1,000,000, and consists of New York and Ohio men, with Col. D. P. Bosworth at the head. A smelter, which has been purchased from Prof. James Douglas, will be brought here and put up within the next three months; it will be connected with the mines by a tramway, the steel for which is already on the ground. Forty men are employed.

Two miles east of Jerome lies the property of the Black Hills C. Co., Ltd., composed of Los Angeles capitalists, upon which fifteen men are at work. An incline of 160 feet has been run and a vertical shaft 90 feet deep has been sunk, both of which are well mineralized. Thos. H. Brown is the Supt. in charge.

The Jerome M. & S. Co.'s property is also situated in the Black Hills district, eight miles southeast of Jerome. Upon this property a shaft 35 feet deep has been sunk in ore running from 17% to 38% copper and ½ to ⅝ in gold per ton. A steam hoist has been ordered. The property is in charge of Doane Merrill.

Besides these properties there are others in the vicinity of Jerome upon which considerable money was expended during last summer; but work was discontinued during the recent flurry in copper stocks in Boston. It is said work is to be resumed on some of these properties in the near future.

A company has been organized which will afford peculiar facilities for the prospecting of mining claims in and about Jerome. It is the Jerome Electric Power Co., capitalized at $400,000. Its purpose is to take water out of Oak creek, a stream consisting of 4000 miner's inches, and to flume it to the edge of a bluff 260 feet high and to manufacture and transmit electric power to whoever wants it. Among the incorporators are H. J. Allen of the United Verde Co., D. J. Shea, J. F. Mullin and E. J. Parkinson. The outlook for these outside enterprises seems bright, and, if continued and successful, must ultimately prove of great benefit to the town of Jerome and relieve it from the charge of being a one-mine and one-man community.

Jerome, Feb. 22.

CALIFORNIA.

CALAVERAS COUNTY.

At Milton the Plymouth Rock mine has been again started up.

DEL NORTE COUNTY.

(Special Correspondence). — The Higgins Bros. & Jenkins placer mining property on Monkey creek has been bonded. The bonding parties have men working and developing the mine.

Extensive operations will soon begin on the Higgins copper mine, lately purchased by San Francisco men. There is a body of ore carrying copper and from $4 to $8 in gold and silver.

Crescent City, Feb. 24.

FRESNO COUNTY.

In the Coalinga district oil sand has been found by the Oil City Petroleum Co. at a depth of 450 feet.

HUMBOLDT COUNTY.

The Big Bar M. Co., owning 300 acres of auriferous gravel at the mouth of Slate creek, on the Klamath river, will resume work. H. Buhne of Eureka is Sec'y and A. Brown Supt.

INYO COUNTY.

The P. D. Q. Cyanide Co. have sold their 50-ton cyanide plant to R. C. Steele, Supt. Reward Milling Co.

KERN COUNTY.

In the Butte Lode M. Co. J. H. Underhill has sold the greater part of his interest and resigned the presidency. C. F. Howland is Pres. and Thomas Miner Supt.

The Randsburg Miner hears that at the Benson well at Goler a water yield of 72,000 gallons per day is assured.

A Pittsburg company will bore a 1000-foot hole on the same belt where the well finished lately by the Sunset Co. is situated.

The Kern River Pipe Line & Storage Co., operating the 4-inch pipe line between the wells of the Kern River Oil Co. and McKittrick, three miles in length, contemplates its extension to Sunset, thirty miles. The three-mile line, including storage tanks, cost $20,000. A 6-inch line from McKittrick to Summit would cost $150,000.

Seventy-two sacks of gold ore have been received at Bakersfield for shipment for reduction. The ore was mined at Greenhorn Mountain and is said by the owner, M. W. Solomon of Bakersfield, to run $100 to the ton.

Californian: Jewett & Blodget's oil strike is verified. In sinking well No. 17, at a depth of 700 feet, oil was struck in such volume as to cause a temporary suspension of operations. It rose in the 9⅝-inch casing to the top, and many hours bailing a 6-inch pump 20 feet in length only lowered the oil 50 feet in the well. The singular feature of this pipe is that it occurred in the first oil sand. Heretofore, in the other wells sunk at Sunset, the quantity of oil in the first sand was so insignificant as to be considered valueless and was shut off by the casing. Why there should be such a difference between the stratum of sand as shown here and in the other wells in that locality is puzzling oil experts. It is the intention, of course, to go down to the second sand.

KINGS COUNTY.

The Black Mountain Petroleum Co., working part of the property of the Krayenhagen Oil Co., is reported to have struck oil sand.

LAKE COUNTY.

The Abbot mine has a new 40-ton furnace, a new shaft house and hoisting works near completion. The Abbot last month turned out 130 flasks of quicksilver. Supt. Boggess says that in a short time its monthly output will be 300 flasks.

MARIPOSA COUNTY.

Merced stock came before Boston investors' attention in 1895; 100,000 shares were issued at $10, par $15; it advanced to 48⅝ and fell back to 18 within six months. It sold at from 6 to 14½ last year.

MONO COUNTY.

In the Standard Con. mine, at Bodie, for the week ending Jan. 31st, 282 tons of ore were crushed; average assay vanner tailings, $8.28.

NEVADA COUNTY.

Grass Valley men have a bond from Mrs. E. C. Huntington of New York on the Banner quartz mine. A company is to be organized to reopen it.

The Dublin mine, Nevada district, has levied assessment No. 2, ½ cent per share.

Tickell & Ritchie have sold to New York men the Champion quartz mine, Maybert district. The new owners will equip the mine with machinery and place it on a producing basis.

PLACER COUNTY.

A telegram from Forest Hill says that the Boston & South Dakota G. M. Co. have struck the Big Blue lead in an upraise from a crosscut from the main Weske tunnel. The company contemplate an electric plant on their Deadhorse ditch claim, and a mill at Turkey Hill to work the gravel coming from the Weske tunnel.

Pioneer stock was issued at $5 in 1895; 100,000 shares, par $10. The company paid dividends in 1898. Its stock sold from 2 to 8⅝ in '99.

C. A. Wikman, Supt. Jupiter mine, Iowa Hill, proposes to drive a tunnel to drain the mine.

RIVERSIDE COUNTY.

The Press reports striking $300 ore in the West Riverside mine, four miles west of Riverside.

SHASTA COUNTY.

(Special Correspondence).—The Texas Consolidated mine, ten miles north of Redding, has been bonded by the Bank of Tehama County to H. C. Woodrow for $60,000. The bonder is to keep six men continuously at work and make a payment on the purchase price in six months.

The Minnesota mine, near Copley, a long-time abandoned property recently bonded by D. McCarthy of Keswick, has been put in repair and is shipping ores.

Pump and power drills have been placed on the Black Spider mine, near Keswick, and three shifts are driving the shaft.

Kahny & Co. recently acquired ten claims in Flat Creek district and have begun work. Ore shipments have already begun from this property.

The Connors Salt Creek mine has opened a new ore body 3 feet wide of fair grade ore.

At the old Spanish mine, near Shasta, new development continues. The new steam hoist is in operation.

The DeShields claim, in Old Diggings district, is developing an ore body of good value.

At the Mt. Shasta mine a new ore body has been found at 305 feet depth, which ensures further work on a renewed and larger scale than has been the case for several months.

In the Bowry Bell mines development continues; about twelve men are employed.

The Mammoth copper properties, upon which the option had expired, will again resume development under the management of the Halifax people, who have also gained possession of the Ballakalala properties. The renewal extends to April 5th and calls for the payment of about $200,000.

Redding, Feb. 20.

SISKIYOU COUNTY.

(Special Correspondence).—The 40-ton cyanide plant, using the MacArthur-Forrest process, and owned by the Portland Gold Extraction Co., G. W. Ingalls Pres., A. S. Additon chemist, at Sawyer's Bar, started up to-day.

Sawyer's Bar, Feb. 23.

The Golden Star M. Co. has levied an assessment of ½ cent per share to make further development of their quartz ledge on Humbug creek, formerly the Spencer mine.

Miners at Quartz Valley and Oro Fino are carrying on extensive operations, with abundance of water. The hydraulic mines are being operated under the supervision of J. O. Rusby at Oro Fino.

The Etna Advance reports some stir in the Happy Camp region over the copper discoveries in the Preston Peak country.

The Journal reports at Ash creek blowing out from Downing & Meyers' quartz claim with a single shot about $1900 in gold, the quartz appearing almost like a mass of gold, with indications of finding a ledge.

TRINITY COUNTY.

Frank H. Hall, Supt. Maple Creek Hydraulic M. Co., near Junction City, operates one of the longest siphon lines in California, over 5000 feet in length.

TULARE COUNTY.

The Visalia Land Office has orders from the Secretary of the Interior to suspend from disposition 1,082,088 acres officially designated, which are likely to be declared mineral land.

A vein of oil is reported struck near Lindsay at a depth of 120 feet, while workmen were boring for water.

TUOLUMNE COUNTY.

Santa Ysabel stock was offered in 1895 at $5 per share; there were then 100,000 shares, par $5; the stock was later increased to 130,000 shares. The stock sold as high as 18 and as low as 6½ in '99.

YUBA COUNTY.

At Rackerby, on the San Jose Co.'s mine, a 5-stamp mill is busy. Five more stamps are to be added.

The Dewey Quartz M. Co. have a mine and mill two miles north of Rackerby.

COLORADO.

CHAFFEE COUNTY.

News: The leasers on the Whale have suspended operations on that property,

owing to the smelters advancing the charges for treatment on this class of ore. It is the opinion of experienced mining men that if this raising of treatment charges on low-grade ores continues that properties producing such ores will have to ultimately close down permanently. It is the large bodies of low-grade ore that made Colorado what she is to-day, and not the small streaks of ore of a higher grade. Why do the smelters make such discrimination in treatment charges against small shippers and in favor of larger producers?

CLEAR CREEK COUNTY.

At Georgetown, the Doric Gold Mines Co. has decided to reorganize the company, and work on the property will be resumed.

EAGLE COUNTY.

The Newhouse tunnel is penetrating Battle mountain. It will be 2700 feet in length and will command a square mile of mining territory. It is now in 400 feet.

EL PASO COUNTY.

Another chlorination plant, to cost $500,000, is to be built in Colorado City by the Standard M. & S. Co. The mill will have a capacity of 400 tons a day.

FREMONT COUNTY.

At Florence is building the reduction plant of the Union Gold Reduction Co. to treat the ores from the Vindicator mine of Cripple Creek. The mill will have a daily capacity of 300 tons, and is expected to be finished by Sept. 1, 1900.

GILPIN COUNTY.

Register-Call: New incorporations are: Fourth of July G. M. Co., to operate in Gilpin county; stock, $1,500,000; the Avon M., M. & Power Co., to operate in Gilpin county, with office in Denver; stock, $1,500,000; the Colorado Mountain M. Co., to operate in Pine district; stock, $1,000,000. The Avon M., M. & Power Co. intends to build a 250-ton concentrating plant on North Clear creek. The company owns the Avon mill, Avon millsite, Nugget placer and water rights on North Clear creek. The mill will be in three sections, independent of one another, and each will be driven by a 43-inch wheel, ore being delivered at the mill by the tramway company and handled automatically in the mill from start to finish, dropping down six terraces during the process. The mill will use rolls.

GRAND COUNTY.

A Boston company has bought 2000 acres of placer ground in Middle park, at the head of Willow creek, and will actively work it next season.

GUNNISON COUNTY.

In the Good Hope mine, Vulcan district, owned by Weiss Bros. of Del Norte, Supt. Dillon reports ore in the east drift of the fourth level, 40 feet from the shaft; it is several feet in width, runs from $300 to $1000 per ton, and is quartz spotted with native tellurium.

LAKE COUNTY.

Chronicle: The Leadville miner is now getting the best price for lead since 1882, when the average price was $4.91. He is now receiving $4.57½ per hundred, as against an average price of $4.27 in 1899 and $3.63 in 1898. For years past the smelters were governed by the "brokers' price," about 25 cents per 100 pounds below regular quotation. The smelters have done away with this brokers' quotation, however, and now pay the miner on the basis of the New York market price, less 12½ cents per 100 pounds, which covers the expense of selling the ore, insurance, commissions, etc. The price for the current week is fixed by the average price of the week previous, and this week settlements are made on the basis of $4.57½. This has been the ruling price, plus 12½ cents, since February 1. One of the results of this increase in lead price has already been noted in the increased production of low-grade lead ore. The first upward tendency was seen in the latter part of 1898, and the increase in 1899 was 17⅝%. The next increase is this last, which is a gain of 7⅝ over 1899, with a generally rising tendency. This gives encouragement for such properties, which with lead down to 3 cents cannot be operated. In 1890 Mr. Blow, then manager of the Silver Cord property, said there were several million tons of low grade lead-sulphide that could be mined through the Silver Cord tunnel. Mr. Blow's idea was that concentration was necessary, but probably the greater part of the material can be handled without any preliminary treatment. A new concentrating mill at the mouth of the tunnel is one of the possibilities. The difference in the value of lead ores is probably best shown by taking the example of an ore carrying, say 14%. In December, 1898, this lead would be worth to the miner $3.36, while at the present time the same lead would be worth $6.51.

OURAY COUNTY.

Ouray reports an assay of ore from the new strike returning 334 ounces in silver and nearly one ounce in gold—a piece of gray copper taken from the surface of the workings of the Trout. It is a blanket vein, and is believed to extend under the town. The vein rock averages fifty ounces in silver, carrying lead and copper values. The strike on the Fisherman returns $20 in gold per ton.

SAGUACHE COUNTY.

The San Luis Valley L. & M. Co. has bought the Baca grant No. 4, comprising nearly 100,000 acres and taking in a large part of the Saugre de Christo range. The Mgr. of the property will be H. B. Davis of Colorado Springs. It is stated that during next year $1,000,000 will be spent in developing and improving the mineral resources of the purchase.

SAN MIGUEL COUNTY.

Post: The Animas Smelting & Refining Co. has incorporated with 100,000 shares at $1 per share. Twenty thousand dollars will be available at once to build a copper matte smelter at Silverton.——T. Allen, Supt. Sampson mill, near Howardsville, has bonded his mine to an Eastern company, which will immediately begin work. Mr. Allen will place a 10-stamp mill at the top of the hill on the Animas river to treat these ores.

SAN JUAN COUNTY.

The Stoiber tunnel is in over 800 feet. The timber sets are 4 feet apart, timbers 12 inches square, red spruce, lagging squared and of the same material. The tunnel is 6 feet wide, 8 feet high in the clear, and is ditched. The tunnel when completed will be three miles long.

TELLER COUNTY.

W. S. Stratton has bought the Temomj mine, on Gold hill, adjoining the Moon-Anchor mine, for $300,000.

At the Anchoria-Leland the News says that in a level drawn from the bottom of the deepest shaft on Gold hill, at a depth of 1000 feet, the miners have cut a 3-foot vein of sylvanite that runs high in gold—fifty to seventy-five ounces.

Times-Citizen: The Burch lease on the Republic of the Mary McKinnie sent out a four-carload shipment of ore that will all average five ounces of gold to the ton. The production of the McKinnie last month amounted to $80,000. In the north drift of the 400-foot level they are drifting on a vein that is 18 to 24 inches in width that will run $200 to $300 to the ton.

Victor Record: The machinery on the Electric claim of the Freeport and Cripple Creek Co. has been removed and the shaft house torn down. The claims of this company, which is much vaunted by a Boston syndicate, lie a mile and a half west of the city. It has been claimed for the property that it was producing ore netting the company $100 a day. A visit to the workings found the property practically deserted. The claims are in the granite without a semblance of such eruptive contact rocks as porphyry, phonolite, andesite or even breccia. Prospectors in the vicinity deny that any ore has ever been shipped and there were certainly no indications of ore around the deserted shaft. ——The Gillett Gold Extraction Co.'s mill has started ore treatment. The company has 1000 tons on hand and contracts ahead.——Mgr. Kline of the Coriolanus has returns on a twenty-ton shipment of smelting ore. The consignment was settled for on a basis of six ounces to the ton.

IDAHO.

SHOSHONE COUNTY.

The Blue Grouse M. Co. at Wallace say that the $10,000 on the bond on the property will be taken up when it becomes due next month. The price at which the bond was taken was $20,000, one-half of which is paid. The company has run an upper tunnel 300 feet through ore and started another one 211 feet lower, showing ore all the way, and part of the time producing a grade which will bear shipping at present prices of lead and silver.

MICHIGAN.

HOUGHTON COUNTY.

At Houghton the Calumet & Hecla Co. has 5000 men on its payrolls. The mines are at Calumet, the stamp mills at Lake Linden and the smelters at South Lake Linden, Black Rock and Buffalo. Practically every part of the property is duplicated, from the hoisting engines to the smelters.

MONTANA.

LEWIS AND CLARKE COUNTY.

At East Helena, across Prickly Pear creek, the smelter company has built a dam for a lake or storage reservoir from slag from the furnaces. The molten slag was run directly from the furnace into a sluice of water, the contact granulating it.

MADISON COUNTY.

The hydraulic pump at the Pole creek placers is the largest of its kind in Montana, giving a head of 2000 miner's inches. The placers are being operated by the Montana Hydraulic G. M. Co., a Toronto corporation.

The Red Bluff M. & M. Co. is operating the Red Bluff mine.

The Pay Rock is being operated by Butte men.

At the Madisonian mine, near Norris, the deal for the sale of the property is off, the option held by British Columbia and Spokane men having expired.

The Thompson Investment Co. of Butte has bought the Klondike claim, near Leiterville, for $10,000.

SILVER BOW COUNTY.

The crosscut on the 1200 level of the Parrot mine reached the ledge and cut through between 40 and 50 feet of fine copper ore.

NEVADA.

EUREKA COUNTY.

Sentinel: As an experiment, the Eureka Con. M. Co. this week made a shipment of ore to the Selby Smelting Co. in California, the object being to determine whether or not Eureka ores can be more profitably sold to the Selby Co. than to the Trust smelter at Salt Lake City. The class of ore shipped will average about $37.50 per ton. The freight rate on this class of ore to Salt Lake City is $8.25 per ton, while to the Selby plant it is $9.50, making a difference of $1.25 per ton. The favorable schedule offered by the Selby Co. on lead ores that carry 20% lead and a return of all gold contained therein has caused our shippers to do some figuring, and they are convinced that they can pay the additional $1.25 freight charges and still get better returns from the California plant than from Salt Lake City.

LINCOLN COUNTY.

The De Lamar Miners' Union have presented the widow of C. J. Pettee, late editor of the Local Messenger, with $60.

LYON COUNTY.

A carload of copper ore shipped to Selby's from the Daniels mine in Mason valley netted $20 per ton—about 15%.

The Gregory copper mine, near Dayton, has resumed work.

WASHOE COUNTY.

Olinghouse placer miners are getting ready to resume sluicing gold.

WHITE PINE COUNTY.

W. B. Lawler of Salt Lake has bonded the Johannah group of gold mines, eight miles south of Cherry Creek, for $17,000.

OREGON.

BAKER COUNTY.

T. L. Lammers, Mgr. Columbia M. Co., has from G. W. Grayson of Oakland, Cal., a bond on the Climax mine in the vicinity of the Columbia, and will develop the property.

Geo. Chapman is about to reopen his custom mill at Sparta. Supt. Perkins will unwater.

The old Gem mine near Sparta, which is under bond, has a shaft 165 feet deep, and will be sunk 100 feet deeper.

JOSEPHINE COUNTY.

The gold dredge Josephine, near Waldo, has resumed operations.

The quartz mill on the Winnington-Pence mine, on Forest creek, is running on rock reported to average $36 to the ton.

TEXAS.

Cinnabar ore is reported being mined in paying quantities in the Texas peninsula, in the southwestern part of the State, near the Rio Grande river. The ore is hauled ninety miles by wagon to the Southern Pacific road.

UTAH.

SUMMIT COUNTY.

Mgr. Jno. J. Daly sends a report of the Daly-West M. Co. for the period from Dec. 31, 1898, to Feb. 19, 1900. During 1899 the company at Park City extracted and marketed crude ores and concentrates of the gross value of $549,721.14, and expended for labor, supplies, etc., $171,810.05. Mgr. Daly calls attention to the purchase of the Morgan group of mines at a cost of $108,000, and to improved facilities for transportation of ore. Formerly the transportation of ore from the mine to the depot cost 85 cents per ton; for up-freight, consisting of coal, etc., the company paid $1.40 per ton. Now it costs 15 cents per ton, both ways. During '99 there was mined and marketed 7792 tons ore, which contained 495,484.90 ounces silver, 3,988,891 pounds of lead, 461,288 pounds of copper and 406.63 ounces gold that sold for $334,445.54. Crude ore was treated at the mill amounting to 17,169 tons, which contained an average of 10.3% lead and 20.3 ounces silver per ton, from which 90% lead and 68% silver was saved. This crude ore was reduced to 4785 tons of concentrates with an assay value of 33.46% lead and 49.8 ounces silver per ton, which was sold to the smelting company for $194,571.68. This ore also contained a small percentage of gold and copper, which was settled for and which is included in the total. A supplemental report from Jan. 1 to Feb. 19, 1900, asks that the ore now exposed be worked, in view of the present lead market, which is almost sure to hold for ten months, but liable to decline hereafter. It is understood that J. E. Bamberger will be the acting manager and Jno. A. Kirby Supt.

TOOELE COUNTY.

(Special Correspondence). — Stockton, the first "gentile" town in Utah, the initial point of the mining industry in "Deseret," was established by Gen. P. E. Connor, in 1862, who camped at the head of Rush valley just prior to his march to Salt Lake City and the establishment of Fort Douglas. His command comprised 850 men, made up of California volunteers. Many of the latter were California miners and prospectors who were encouraged by their commander to explore the country from a miner's standpoint. Through the latter's assurances of protection to miners and prospectors other men soon came and within a year claims were staked at Stockton, Bingham and Camp Floyd (now Mercur). The Jordan lode was located in 1863 and the following year the Jordan M. Co. incorporated and on the property a tunnel was driven at a cost of $60 per foot.

In 1864 Gen. Connor and associates erected the Pioneer smelter at Stockton, which was the first reduction plant established in the intermountain region. A year or two later a second smelter was built, having a reverberatory furnace. The ores were found to be silver-lead and iron, being carbonates and sulphides, to handle which the California placer miner had to learn new lessons in metallurgy. But, however expensive, those lessons were learned and the business of mining spread from the Oquirrh to the Tintic range and to the lofty spurs of the Wasatch. As a result, we have to-day such camps as Bingham Canyon, Tintic, Mercur and Park City, where great industries are firmly established, where thousands of people are employed and millions of dollars are produced.

The Honerine and Basin claims at Stockton were located and work thereon commenced in 1864, and the two were afterwards consolidated. For years the group was successfully worked, the production amounting to over $2,000,000. By 1890 it was worked down to the water level, requiring pumping facilities, and the silver depression of 1893 closed it down. The property is now owned by Boston parties, with C. H. Scheu as Mgr. and E. J. Raddatz as Supt. Work has been resumed, and, as has been noted, equipment to pump water by compressed air has been provided; and it is expected the water will soon be lifted from the lower levels and shipments resumed. The original workings consisted of a tunnel running southward on the Honerine and an incline on the Basin on the opposite side of the ridge, tunnel and incline running toward each other on the same fissure. The tunnel advances 3500 feet and the incline sinks 700 feet, the two being connected by a 600-foot level, making 4800 feet of continuous work on a north and south ledge. In the course of the tunnel several blue lime veins were crosscut. At the intersections of those east and west veins with the north and south fissures is where the richest ore is found. The latter trends along a porphyry dyke and the east and west veins are between blue and gray lime walls. The gangue material is an oxide and sulphide of iron, interspersed with streaks of talc. Down to the water level the ores are largely carbonates, changing to galena, or sulphides, at and below the water level. At a point in the tunnel, nearly 3200 feet from the entrance, a shaft sinks 145 feet on one of the veins, at the bottom of which a station pump is set and ready for work. A hoist is set at the collar of the shaft and as soon as the water is out sinking on the shaft will be resumed. At the tunnel entrance is the air compressor and other equipment. A force of thirty men is employed at present. It is considered by many that the results of deeper workings in the Honerine will be to some degree a demonstration of value to other mines in the district. There are about 60,000 tons of mill tailings at the old Connor mill in Stockton which it is believed will be treated in the near future.

The Ben Harrison mine, belonging to the Stockton G. M. & M. Co., located in Soldier Bridge canyon, is opened through a 1300-foot tunnel, which parallels the quartzite formation and crosscuts a number of lime veins, some of the last-named being from 10 to 30 feet wide. The ores show fair values in lead, silver and gold. Development work is progressing under the superintendence of H. D. Trenam.

The Lion Con. Co. have a large group of claims in the same locality. An incline sinks 300 feet, going against the dip of the vein and cutting it at 150 feet, where the ores were a silver-lead carbonate. From this level the ores on the vein were stoped out to the surface for several hundred feet longitudinally. On the opposite side of

the ridge a tunnel drifts on the vein to connect with the workings through the incline. In this mine, as in others, the valuable ores are in the east and west veins that cut the porphyry formation at right angles. A shaft is to be sunk at a point lower down the slope, from which drifts eastward will be run to cut below present workings. This group is under the management of F. E. Wilson of Salt Lake City.

The Silver Coin group, in charge of Supt. Alex. Maze, is a new property and is being developed by a tunnel which is in about 400 feet. In this distance two of the characteristic blue lime ledges have been cut, which yield good silver-lead values, the ores seeming to be a mixture of galena and carbonates.

The Hercules comprises four patented claims on which development was begun three years ago. The property is managed by E. P. Michenor, who states that it has been on a paying basis since the time the shaft reached 100 feet depth. I. A. Benton and H. E. Zerbe of Salt Lake City are interested with Mr. Michenor in the property. An incline shaft is down 350 feet, following the dip of an east and west vein, from which drifts run on the vein in both directions. From one of the lower drifts an upraise has been made 265 feet, all the way in ore, and connecting with a winze from the surface. The walls are a quartzite on the north and south veins and a dolomite lime on the east and west veins, the latter having a blue lime gangue. The greatest values are in chimneys at the vein and fissure intersections. It is estimated their lowest workings are still about 100 feet above the water level.

The Bunker Hill, comprising three patented claims, is developed by a shaft 200 feet deep, which goes down on the vein, on which there are drifts aggregating 450 feet. The vein characteristics here are similar to those on the Honerino and others. The ores run high in silver and lead. A steam hoist will soon be put up, after which the shaft will be sunk deeper. A recent shipment of forty tons of ore is said to have netted about $50 per ton. J. C. Reynolds is Supt. of the Bunker Hill.

The Rush Lake is the name of a group of claims on which is a 120-foot shaft and is equipped with steam hoist. This has produced some good ore, and Mr. Reynolds, the owner, states that developments are to continue.

The Catherine is one of the old mines of the sixties and was quite a producer for several years. The workings are through a tunnel that was driven on the vein, connecting with a shaft that sinks 600 feet from the surface. The ores here are characteristic of those of the district. It is in charge of J. Collins.

The Grand Cross, in Soldier canyon, is under bond to McDonnell, Thomas and Murray, whose time extends two years. A tunnel being driven is in 900 feet, five shoots of ore having been crosscut in that distance, it is stated. Some ore has been taken out and a shipment is expected to be made about March 1st.

The general condition of mining in Stockton district is one of improvement, and it seems easy to foresee greater activity. About 150 men are employed in the district and the payroll for January, 1900, amounted to about $6000. WASCOTT.

Stockton, Feb. 19.

(Special Correspondence).—Work in the Northern Light mine at Mercur aggregated 1967 feet within the past year. The gross earnings of mine and mill amounted to $19,223, the expenditures amounting to $27,119 for the year. The mill was closed down last October at the conclusion of a four months' run of 2223 tons of ore.

The employes of the Daisy mine and mill at West Dip, Mercur district, took control of operations last week and are to apply the proceeds on wages due them.

Mercur, Feb. 22.

The directors of the Overland M. Co. have ordered the bonding of the proposition for $150,000 for improvements. The shareholders will ratify on 17th inst.

The Tribune says that a consolidation of DeLamar's Mercur mines and those of the Mercur M. Co. will soon be accomplished. Pres. J. Dern of the Mercur and Capt. DeLamar of the other side have arranged to meet in Paris this month.

WASHINGTON COUNTY.

The furnaces of the St. George C. M. Co. have started on Dixie ore.

WASHINGTON.

OKANOGAN COUNTY.

(Special Correspondence).—Naturally, a great interest attaches to the first location in any mining section, and particularly so if it prove to be a winner, and it is a singular fact that, in almost every instance within the last thirty years, the first location has so proven in every prominent mining camp in the United States. Here on Palmer mountain the first location has not only been proved a winner, but it has the distinction of being the first quartz lode carrying gold in paying quantities located in the State of Washington, and is now about to resume operations. This is the Black Bear, which, with a sister location—the War Eagle—were merged into the Black Bear-War Eagle G. M. Co., incorporated, capital $1,000,000. Improvements are now nearly complete, and it is expected to start five stamps dropping on March 1st and the others as soon as they can be installed. While at the Black Bear mine, the main shaft has been sunk to 250 feet, two compartment, and timbered all the way down. A 22 H. P. gasoline hoist (see illustration, first page) has been installed with self-dumping buckets and ore bins of large capacity, and the ore will be wagoned to the mill two and one-half miles until the wire tram is completed. The Black Bear has three parallel veins cropping on the surface, the shaft being sunk on the first, and a drift has been started from the bottom to cut the other two lying to the north, which will be over 200 feet in length and will be the deepest workings. A level was run from the shaft at 100 feet both east and west and about the same amount of levels at 150 feet. In both these levels stoping and drifting develops ore sufficient to run the mill one year. The ore averaged $24 in the batteries and on the plates, and no concentrates or tailings were saved or treated in former working; better results are expected from now on. At the War Eagle the shaft will be sunk to 250 feet and drifts run east and west on the vein. Both these mines were filled with water until six months ago, when the Palmer mountain tunnel cut the War Eagle ledge in their own ground, the Wisconsin Central at 1000 feet depth and drained both the War Eagle and Black Bear, indicating a vein running diagonally from the Black Bear to the War Eagle, through which the water was drained. The former working of the War Eagle showed the ore to be of $21 average value.

The vein cut in the Palmer mountain tunnel within the Wisconsin central lines (known as the War Eagle vein) was 42½ feet wide and contained 35 feet of ore averaging $35 in value; 8 feet of it assayed $176.83. The diorite formation through which this vein cuts assayed more than $3 for several feet each way from the walls.

The Palmer mountain tunnel, since cutting the War Eagle vein when in 2000 feet, has in the next 800 feet cut seven more veins, or one for nearly every 100 feet run; they average from 2 to 8 feet in width and carry from 12 inches to 4 feet of ore, the average of which is $28. This company is about beginning the improvement of a water right one mile from the portal of the tunnel, which has a 370-foot fall and 5000 miners' inches of water at the driest season of the year. Their consulting engineer informs them that this will give them 3000 H. P. Electrical machinery will be installed capable of transmitting power twenty-five miles, which will be both profitable to seller and economical to user. They have also been advised that they will, by the aid of concentration and cyanide, be able to save 97% of the values of their ores, and the different reports of experts make 75 cents per ton the minimum and $2 the maximum for mining and treating. They are now considering propositions for a plant; the deciding upon, manufacturing and installing will consume the better part of a year's time and the outlay of a large sum of money. They expect to reach the Black Bear vein in from 500 to 700 feet farther in the tunnel. This will be in their own property—the Helena Belle—but only a few feet from the end line of the Black Bear. Perhaps it should be stated that the Black Bear and War Eagle are entirely surrounded by the tunnel locations—some fifty in number—all contiguous, six having recently been added to the forty-four mentioned in a recent letter. This aggregation of claims are situated on the southern slope of the mountain, extending from base to summit.

Perhaps the next two most promising properties on Palmer mountain at this time are the Bull Frog, on the northwestern slope of the mountain, and the Wehe Con., on the southeastern slope, both of which are attracting attention.

The Wehe Con. consists of twenty-six locations, through which run several parallel veins, two of which are very prominent, one cropping for 9000 feet and the other for 6000 feet. The principal work is being done on the large vein. A 500-foot, two-compartment vertical shaft is now down nearly 200 feet, and, as soon as a hoist is installed, will be continued to 500 feet, with levels run every 100 feet to the vein. A 500-foot tunnel is also being run on this vein, which will gain 300 feet in depth, while a 500-foot tunnel is being run on the other vein. This work is all under contract and the hoist is now en route; 100,000 feet of timbers and lumber is under contract and is now being delivered, and the opening of spring will see many surface improvements. It is hoped that by July 1st a treatment method can be decided upon. The ore is a sulphide carrying $20 in gold values and quite an amount of silver, the average of which has not been ascertained. The company was financed by North Dakota and Cincinnati men.

The Bull Frog is composed of fifty mining locations and six mill sites. Through these fifty contiguous locations are running sixteen parallel veins of good width, showing good gold values. The principal work has been done on the Phantom location, through which runs the sixteenth cropping vein. A shaft is down 130 feet, and from the bottom a drift has been run 142 feet. In so doing they have cut through ore bodies from 4 to 8 feet in width in the last 85 feet; the formation between gives a small assay. Clear across the average of the ore is $19.50 and yields easily to cyanide treatment, there being no copper in the ore. The company own a cyanide plant, which is under the new organization and management, being reinstalled at a more convenient location. A hoist will be put in and the shaft put down to 500 feet, with levels every 100 feet, to prove the ore bodies now cut. A 2000-foot tunnel would crosscut the whole sixteen veins and gain nearly as much depth. What is noticeable upon Palmer mountain is the frequency of parallel veins and the grouping of so many contiguous locations in one property, the topography of the mountain being favorable to this method of mining and gaining great depth.

Loomis, Wash., Feb. 20.

WYOMING.

Prof. W. C. Knight of the University of Wyoming ascribes the failure of this State to produce a Leadville, Deadwood or Butte to the custom of shallow mining there. "There is not a shaft in the State, so far as I know," he says, "that is 300 feet deep, and yet from shallow workings of this kind prospects have produced from $40,000 to $200,000." Inexperienced miners, a loose system of mining and dishonest manipulation, he says, have been the stumbling blocks in the way of big successes in the mining industry of Wyoming.

FOREIGN.

BRITISH COLUMBIA.

Almost the entire production of the War Eagle mine, says Mgr. Kirby, has been derived from its main vein and from a single ore shoot in this vein. This shoot has a dimension of 300 to 450 feet along the vein and has now been exposed to the sixth level—a depth of 755 feet measured on the vein. It is so located that its median line roughly coincides with the line of the main shaft. As usual, the vein area included within the shoot limits carries pay ore in irregular patches or masses interspersed with barren material or ore too low in grade for profit. The different pay ore bodies vary in grade from $30 or $40 down to the pay limit. The structure is somewhat complicated by numerous dykes and faults and by branching of the vein. Moreover, its width in places and the irregular distribution of the pay bodies increase the proportion of development work necessary. About 640 feet east of the shaft the main vein is crossed at an angle of 55° by a smaller vein. In it an excellent ore body, apparently another ore shoot, has recently been discovered. It has a dimension along the vein of 120 feet, an average width of 11.1 feet and has been stoped to the surface 50 feet above. This stope has yielded 5966 tons, averaging $23.38 per ton, smelters' gross assay value. A winze has been sunk 60 feet in ore, but the work has not yet gone far enough to prove the limits or continuity of the ore body. So far as known, the first four levels are practically worked out. There are some small remnants, and future prospecting may add something to their tonnage, but there is no reason to expect any important additions.

Miner, in Boundary district: There are about 175 men working in Camp McKinney.——The Sailor shaft is down 200 feet, and it is intended to put in a seven-drill compressor.——It is expected that work on the pyritic 250-ton smelter, to be built at Grand Forks, will be started next month.——Five tons of ore from the Review mine, at Chesaw, are shipped for test to San Francisco, New York and Chicago.——Roasting of ore in heaps will be started at the Granby smelter by April 15th. Final payment of $11,000 has been made on the bond of the Red Rock claim in Greenwood.

SOUTH AFRICA.

Consul-General Stowe writes from Capetown: "The mine owners of the Transvaal are not idle, but have their engineers and draftsmen at work preparing plans, and orders are being placed somewhere for mining machinery and plants to replace what may be destroyed or injured and in anticipation of new operations and increased business. Many new plants are lying at seaports, stopped in transit. The coast cities are preparing their docks, now inadequate and crowded beyond their capacity, for the great influx of goods when the strife is over. Cape bay is crowded with vessels; as many as eighty to ninety have been counted at one time. I desire to impress upon American manufacturers the necessity of earnest effort and prompt shipments to gain this trade. It is to be regretted that orders are being refused or accepted and held back by American manufacturers in the fear of non-payment. Such action may seriously affect future business. If they are unable to fill orders, they should not hesitate to say so; but they should not accept and fail to ship."

Industrial Notes.

—A railroad is to be built from Ione to Jackson, Cal.

—San Francisco pays annually $1,000,000 for telephone service.

—Oil as fuel for welding is now used by the Southern Pacific Co.

—Dry weather in Arizona interferes with all industrial projects.

—A telegraph line is to be built this season from Ashcroft to Atlin, B. C.

—Less than the normal amount of snow is reported in the California Sierras.

—California oil companies are being incorporated at the rate of three daily.

—The Everett & Monte Cristo, Wash., Railroad is to be repaired and rebuilt as far as Silverton.

—In the U. S. Senate has been introduced a bill appropriating $250,000 for the construction of a U. S. mint at Portland, Or.

—The Denver & Rio Grande Railway has ordered fifteen consolidation locomotives, to have 22x28 cylinders and weigh 190,000 pounds each, without tender.

—The Southern Pacific will make the Carson & Colorado road a broad gauge line and extend it from Keeler southwest to Mojave, Cal., a distance of eighty miles.

—The Western Union Telegraph Co. has bought all the lines of the Deseret Telegraph Co., extending throughout Utah and to Mormon settlements in Idaho and Nevada.

—Gen. A. W. Greely, Chief Signal Officer, U. S. Army, says that the energies of his department are being directed toward the establishment of a thorough telegraph and telephone system in the Philippines.

—Mgr. Grant of the Utah and Sioux mines and the Farrel mine says that Messrs. Farrell, Grant & Wallace of Utah, if co-operation is secured, will build a smelter which will be operated independently of the trust.

—It is expected that at the annual meeting of the American Steel & Wire Co. steps will be taken to absorb the American Mining Co., the American Steamship Co. and the American Coke Co. of Pennsylvania. The capital of each is $1,000,000.

—Carlie, Dittmar & Weitbrec have the contract to build the west end of the Colorado Springs & Cripple Creek Railroad. About seventeen miles of grading is to be done; the cost will be near $600,000. They expect to employ about 600 men and finish by Nov. 1, 1900.

—The Denver Union Water Co. will begin work on the new power plant on the south fork of the Platte river. The dam is being constructed by the company at the junction of the south fork of the Platte river and Goose creek, forty-five miles from Denver. In connection with the dam and Cheesman reservoir the company has planned a power plant to furnish cheap manufacturing power for Denver.

—Consul Stowe, writing from Cape Town, suggests that contracts for the building of railroads, for supplying the army, jails and the public institutions are open for bids, and the consul advises American exporters to make preparations now for the commercial invasion of South Africa after the war is over. Wants of every description will then have to be supplied, and the consul observes that it behooves American manufacturers and producers to be prepared to obtain a part of this trade.

—From 1877 to 1898 the output of coal in Russia rose from 1,774,193 tons to 12,032,258 tons; pig iron from 370,967 tons to 2,161,291 tons; steel from 48,387 tons to 1,451,612 tons. It is said that there is a dearth of coal in Russia, the native mines no longer being able to keep pace with the needs of metallurgical works and railways. The demand for coal has much increased of late years, owing to the dearness of wood. It is intended to relieve the situation by a diminution of the duty on foreign coal, and to increase the output of iron by giving over to private enterprise the government mines of the Ural.

Personal.

JOHN B. STEIGER has returned to Montana after a four years' absence in South Africa.

ALBERT HOLDEN, Pres. Centennial Eureka of Utah, has returned from Central America.

W. H. NUTTING will superintend the construction of the pyritic smelter at Bingham, Utah.

MACDONALD AND HUGHES of San Francisco are examining Shasta county, Cal., mining properties.

AUG. MATHEZ goes to China for Samuel Newhouse, who has government mining concessions that are to be exploited.

L. A. GROSS, Supt. Centennial mine, Drytown, Cal., is visiting mining property in which he and associates are interested at Ewen, Or.

F. CORKILL, former Supt. Dead Horse mine, Tuolumne county, Cal., is now connected with F. M. Smith's borax workings in southern California.

THE Council of the University of Tasmania recently asked the University of California to nominate a Professor of Mining. Frank A. Rich, a graduate of the College of Mining, has been named for the position.

W. C. RALSTON, Pres. California Miners' Association, has appointed as delegates to the International Mining Congress at Milwaukee, Wis., to represent the Association Lieut.-Gov. J. H. Neff, W. S. Keyes, J. W. C. Maxwell, J. F. Halloran.

STATE GEOLOGIST GALLAGHER of Missouri states that "within the next five years Missouri will startle the world with the great amount of lead, zinc, copper, nickel, cobalt and coal mined in the State. Missouri is rich in these minerals—the richest of any State in the country."

T. H. OXNAM, mine manager, and H. A. Cohen, financial manager, for Capt. De Lamar, have returned to San Francisco from Bully Hill. Plans for the new smelter are about completed. Sidney Sprout and C. W. Waller of San Francisco are examining feasible electrical sites on Pit river, Cal.

Commercial Paragraphs.

THE Robbins Conveying Belt Co., New York City, has moved its offices to the Park Row Bldg., occupying the North tower. Its machine shop is being removed to Passaic, N. J., where a complete factory is established.

THE Jeanesville Iron Works Co. of Jeanesville, Pa., report finishing a triple expansion condensing mine pump of the following dimensions: Diameter of high-pressure cylinder, 16 inches; intermediate, 24 inches; low pressure, 40 inches; diameter of plungers, 16 inches; stroke, 48 inches; length over all, 46 feet 9 inches; width, 11 feet 6 inches; height, 9 feet 9 inches; capacity, 3500 to 4000 gallons per minute against 300 feet head. Pump, complete with condenser and fittings, weighs 175,000 pounds. The condenser is independent duplex type, size 10x12x18 inches. This is the first pump having Corliss valve motion to be erected at the Jeanesville shops, and has been christened "The Monarch."

Catalogues Received.

Catalogue No. 40 of the M. C. Bullock Mfg. Co., 1170 W. Lake St., Chicago, treats of portable hoists, their construction and design, with sectional drawings, tables of sizes and styles in detail, and description. It will be sent free anywhere upon application.

Smooth-On Mfg. Co., 32 pp., 12 mo.; explaining process of manufacture, practical value and use of their iron cement; of interest to everyone having anything to do with anything made of iron. The booklet will be sent free of charge to anyone anywhere by addressing the Smooth-On Mfg. Co., 547 Communipaw Ave., Jersey City, N. J., or their Pacific Coast Agts., Madison, Bruce & Sellers, 34-36 Steuart St., San Francisco, Cal.

Recently Declared Mining Dividends.

Bunker Hill & Sullivan Mining & Concentrating Co., Idaho, $21,000; March 3.

Westlake, Cal., Oil Co., 2%; March 1.

Independence T. & M. Co., Colorado, 1 cent per share $12,500; March 1.

The American Smelting & Refining Co. will distribute a double dividend this month.

Homestake M. Co., South Dakota, 25 cents per share, $52,500; Feb. 25.

Raven G. M. Co., Colorado, $10,000; payable March 20.

Pennsylvania M. Co., California, 10 cents per share; March 1.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING FEB. 20, 1900.

643,737.—WARDROBE—Lizzie M. Adams, Portland, Or.

643,837. — CREMATORY CARRIAGE — P. Beanston, S. F.

643,626.—TRUCK LIFTER—J. H. Blake, Winslow, Ariz.

643,808.—GAME BOARD—Brewer & Hayes, Watsonville, Cal.

643,838.— PLOW —A. G. Carter, Fresno, Cal.

643,740.—POTATO DIGGER—J. T. Cecil, Los Angeles, Cal.

643,839.—QUICKSILVER FURNACE—H. C. Davey, Calistoga, Oal.

643,635.—VAPOR BURNER—F. B. Duffy, Los Angeles, Cal.

643,793.—SHIRT—E. R. Gould, Spokane, Wash.

643,746.—GAS GENERATOR — L. R. Le Lande, Los Angeles, Cal.

643,877.—PROTECTION AGAINST STEAM FROM KETTLES—C. Lorenzen, Oakland, Cal.

643,881.—RAILROAD SWITCH STAND—W. McCaffery, Tyler, Wash.

643,748.—EDUCATIONAL CHART—C. T. Meredith, San Diego, Cal.

643,749—TELEPHONE DIRECTORY—L. H. Mertz, Los Angeles, Cal.

643,879.—FARE REGISTER—J. G. Miller, S. F.

643,971.—SPINNING FRAME—J. H. Northrop, Tustin, Cal.

643,777.—GAS GENERATOR—C. Ogburn, Riverside, Cal.

643,849.— THRASHER FEEDER — Patterson & Hill, Madera, Cal.

643,985.—PUMP PISTON—A. J. Salisbury, Los Angeles, Cal.

644,034 — ACETYLENE GENERATOR — Schuler & Granat, Stockton, Cal.

643,782.—FIBER PULLEY—J. R. Thame, Holcomb Valley, Cal.

643,857.—EXCAVATOR—E. M. Zahl, Portland, Or.

32,252.—DESIGN—C. P. Littlepage, Ballena, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PROTECTOR AGAINST STEAM FROM KETTLES.—Coby Lorenzen, Oakland, Cal. No. 643,877. Dated Feb. 20, 1900. When vessels such as tea kettles which are used to boil water and other like purposes, have to be again filled with water, it is usually necessary to remove the cover from the top and this allows a volume of hot steam to escape which is dangerous to the operator. This invention is designed to protect the user from this steam and to provide for the filling of the kettle without allowing this volume of steam to escape in such a manner as to injure the user. The attachment consists of a flanged cover adapted to be seated in the top opening of the vessel and formed rigid, with a receiver which is provided with a removable supplemental cover. This receiver has a tubular extension from its lower end which projects to a point near the bottom of the vessel, and the cover has a steam discharge at one side protected by an enclosing hood.

CREMATORY CARRIAGE.—Peter Beanston, San Francisco, Cal., assignor to G. R. Fletcher, of same place. No. 643,837. Feb. 20, 1900. This invention relates to a carriage which is designed for use in connection with a crematory furnace. It consists of a lower and an upper carriage, the first named traveling upon a permanent track to advance it to a certain point with relation to a furnace front. Means carried by the apparatus serve to check the lower carriage at this point, at the same time allowing the upper carriage to move forward upon the lower one so as to project the support of the body into the furnace, and at this point the upper carriage is checked, and there are means for lowering and depositing the body upon a supporting cradle where it is to be destroyed. After the body has been thus deposited the carriages are successively returned, the upper one upon the lower, and the lower one withdrawn to its normal position.

Obituary.

JACOB PFAFF, president of the Buckminster, Cal., quicksilver companies and Santa Ysabel, Cal., G. M. Co., died in Boston last week, of paralysis, aged 71.

Latest Market Reports.

SAN FRANCISCO, March 1, 1900.

SILVER—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59¾ cts. (1000 fine); San Francisco, 59¾; Mexican dollars, 48½c.

According to recent report of the directors of the French Mint, the gold produced in the last fifteen years has been worth $2,500,000,000, of which the Transvaal has yielded $386,000,000. In the arts there have been used 200,000 pounds, while coinage annually requires an amount varying between 660,000 and 1,320,000 pounds, apart from recoinage. There has been a constant increase in the output of silver, in spite of the fall in price from $42.46 per kilogram to $19.30. The production has risen from 3000 tons in 1888 to 6000 tons in 1898. Two million two hundred and fifty thousand pounds are absorbed in the arts, the United States being the largest user for industrial purposes.

COPPER.—New York: Lake, 1 to 3 casks, 16.75 cash; carload lots, 16¼; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.00; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17½@18. Mill copper plates, 21½c; bars, 23½@25c.

It is reported that the Calumet & Hecla M. Co. has sold 15,000,000 pounds copper to American consumers at 16c per pound.

LEAD.—New York, $4.70; St. Louis, $4.70; San Francisco, $4.90; pipe 7½, sheet 8¾, bar 6½c. London, Soft Spanish Lead, £16 10s=4.72c per lb.

SPELTER. — New York, $4.70; St. Louis, $4.70; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

IRON. — Pittsburg, American soft—pig—large lots—$25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c.

STEEL.—San Francisco, bar, 12c to 20c per lb.

QUICKSILVER. — New York, $51.75; London, £9 14s; San Francisco, local, $51.50 ℔ flask of 76½ lbs.; export, $47.50.

PLATINUM.—San Francisco, crude, $16 ℔ oz.; manufactured, $19.50@22.00

FERRO-MANGANESE. — San Francisco, ℔ ton, $30.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

TIN.—New York, pig, $32.50; San Francisco, $34.50; bar tin, ℔ lb, 40c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 40c to 50c.

NICKEL.—New York, 40@45c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.80 50-lb lots; San Francisco, $2.50 to $3 lb lots.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ℔ set; 14 oz., 40s., 11c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

WANTED.

A Rich Placer proposition, adapted to working by Steam shovel method. Description to receive attention must be accompanied by reliable reports and references.

ADDRESS:

EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver

——FOR SALE BY——

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

Experienced Mining Engineer (age 40) reports on mines and their economical development; ore dressing; processes; mining machinery and mill construction. References. P. O. Box 971, Denver, Colorado.

San Francisco Stock Board Sales.

SAN FRANCISCO, March 1, 1900.

9:30 A. M. SESSION.

800	Belcher	26c	200 Sierra Nev. 35c
300	B. & B.	35c	200 ..... 34c
200	Challenge	20c	600 Union.. 23c
100	.....	21c	300 Y Jacket. 18c
200	.....	22c	600 Mexican. 20c
100	Chollar	25c	100 Ophir 55c
100	C. C. & V.	$1 45	400 Potosi 29c

2:30 P. M. SESSION.

100	G. & C.	14c	500 Belcher 25c
100	Chollar	29c	200 Sierra Nev. 36c
400	.....	30c	600 Utah 09c
100	Potosi	31c	100 Union Con. 22c
300	.....	32c	100 Caledonia 49c
100	H. & N.	33c	5000 Silver Hill. 03c
500	Crown P't's	13c	400 Andes 11c
200	Y. Jacket	19c	100 Standard. $2 75
60	.....	21c	

SITUATIONS WANTED.

BY MINING ENGINEER,

who can produce first-class testimonials and good local references, position as superintendent or assistant. Highly scientific and thoroughly practical. Ten years' practical experience and management in Australia, New Zealand and America and northern placer country. First-class assayer and underground surveyor. Address L. H. D., this office.

By a Practical Miner who is thorough and up to date in working a mine. Can handle men to advantage. Understands milling, concent ating and the erection of all kinds of mining and milling machinery. With some years of experience. Will accept a position to manage a mine or mill. First-class testimonials furnished as to abilities, int grity, etc. Address QUARTZ, care Mining and Scientific Press.

Mining Engineer and Metallurgist, technically educated, with fifteen years of practical experience, is open for a new engagement as expert or superintendent. Specialty the treatment of rebellious silver and gold ores. Experienced in designing, building and running reduction works. Speaks and writes Spanish fluently. Address ALPHONSE BENO, P. O. Box 814, City of Mexico.

Competent Engineer Wants Position

to take charge of machinery, or to run hoist, or mill engine, or steam pump. Twenty-five years' experience in Wales and the United States. R. BLACKWELL, Grass Valley, Nevada Co., Cal.

Wanted—A Position as Superintendent

in a hydraulic mine by a miner who has had twenty years' experience. Best of references as to ability, honesty and sobriety. Address S. O. G., care of Mining and Scientific Press.

Metallurgist and Chemist, technical graduate, fifteen years' practical experience in Mexico and the United States, familiar with the treatment of gold, silver, copper and lead ores, desires engagement. Address METALLURGIST, this office.

WANTED.—By a Practical Miner and MINING BUSINESS Man, Position as Manager or Superintendent. Speak some Spanish. Would leave the United States if necessary. Good references. Address SUPERINTENDENT, this office.

WANTED.

WANTED.—A Second-Hand White Howell Roaster, also a Revolving Drier.

Must be in good repair. Address ARTHUR HENDEY, Agent, Copper Chief Mining Company, Jerome, Arizona.

Wanted, $1000 Cash

to construct a machine and join in securing patent and placing on the market. Just the thing for Cape Nome beach sands. Adapted to follow diggings, pumping, dredgings. Cheaply handled. Float and fine gold recovered. Magnetic iron instantly removed. New and successful application. Don't apply unless have cash to invest. Capacity 15 tons per hour. E.W. KEELER, 712 Sutter St., S. F.

WANTED.

PARTY TO DEVELOP A COPPER PROSPECT,

ONLY FIVE MILES FROM RAILROAD.

138-foot shaft. Several tons of ore on the dump. High-grade rock. Address G. F. CLARK, Tempe, A. T., care of I. S. Watrous.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

M. S. HAUSER,

Room 39, 3 California St., San Francisco, Cal.

Will act as purchasing agent for mining companies.
Will use the benefit of his wide experience in getting the best articles at the lowest prices, securing low freight rates, and prompt delivery.
Will submit estimates on all kinds of supplies.
Will work for either a small salary or a commission, and show a saving greatly in excess of charges.

NOTICE OF STOCKHOLDERS' MEETING.

A Special Meeting of the Stockholders of the Mammoth-Garfield Gold Mining Company, for the purpose of discussing and taking action on a proposition by the Board of Directors to sell a portion of the company's millsite in Shasta County, California, and also to subscribe on behalf of the company for certain shares of the capital stock of the Alta Sierra Gold Mining Company of California, and to transact such other business as will be brought before the meeting, will be held at the office of the company, Rooms 50 and 54, No. 120 Sutter St., San Francisco, California, at 2 P. M. on Monday, March 19, 1900.

By order of the Board of Directors.

SAM. W. CHEYNEY, Secretary.

February 28, 1900.

FOR SALE.

10 H. P. Gasoline Hoist for Sale.

Complete outfit in good condition. Price low. Address PAUL J. PITNER, Placerville, Cal.

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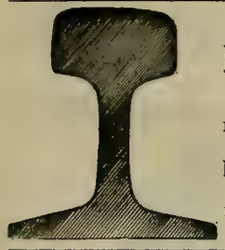
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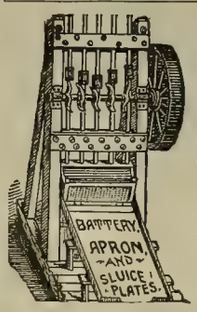
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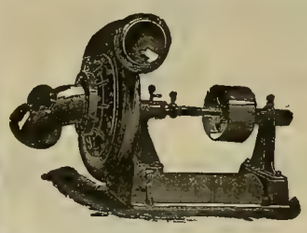
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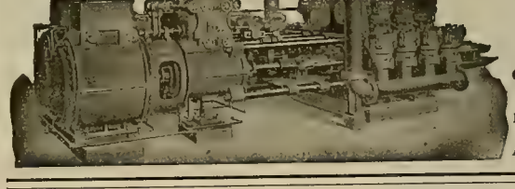


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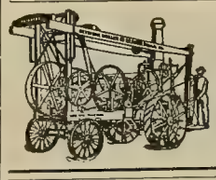
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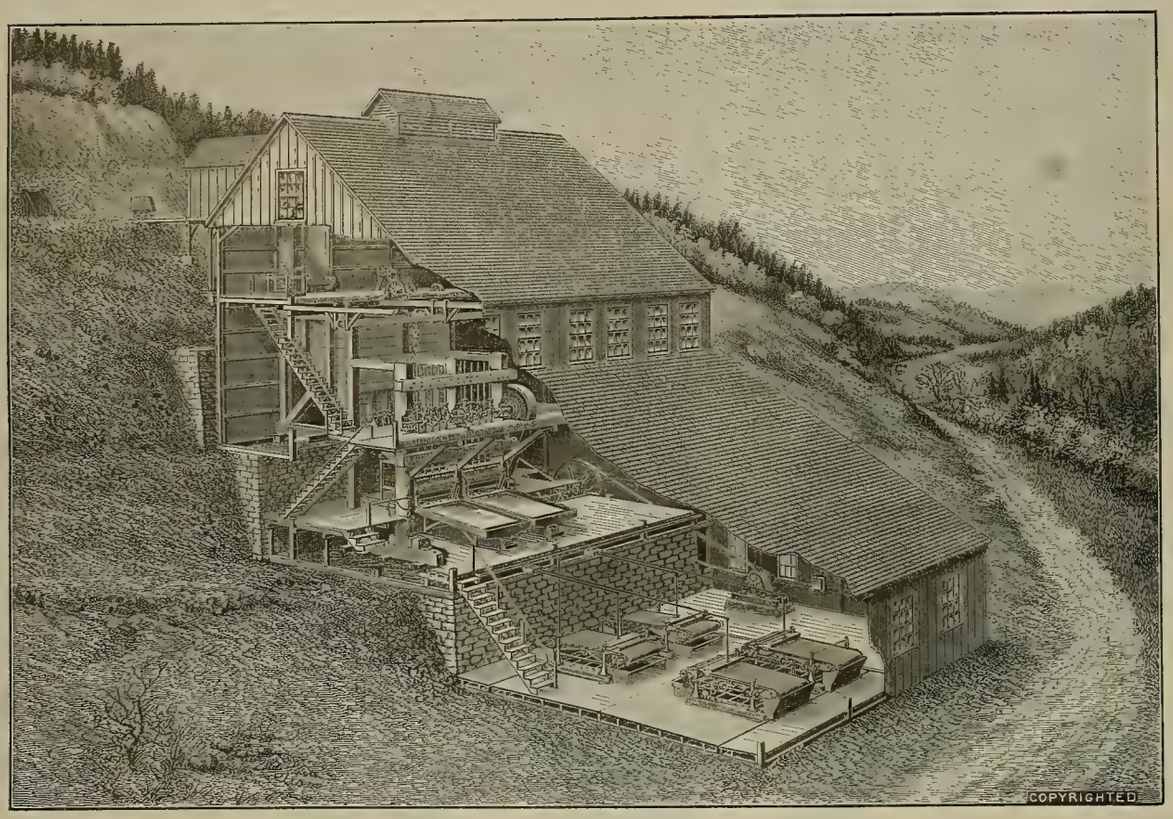
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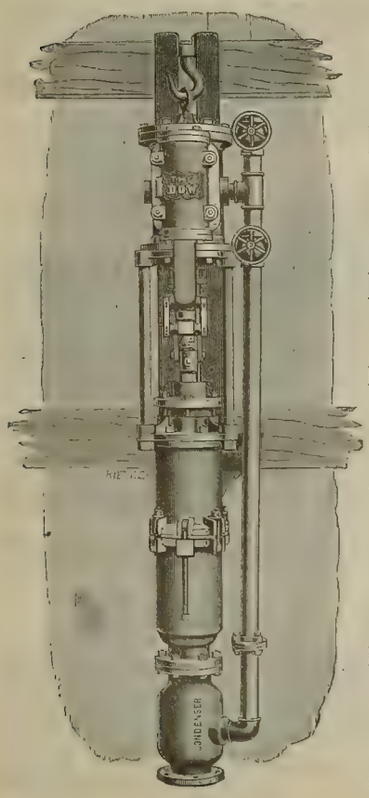
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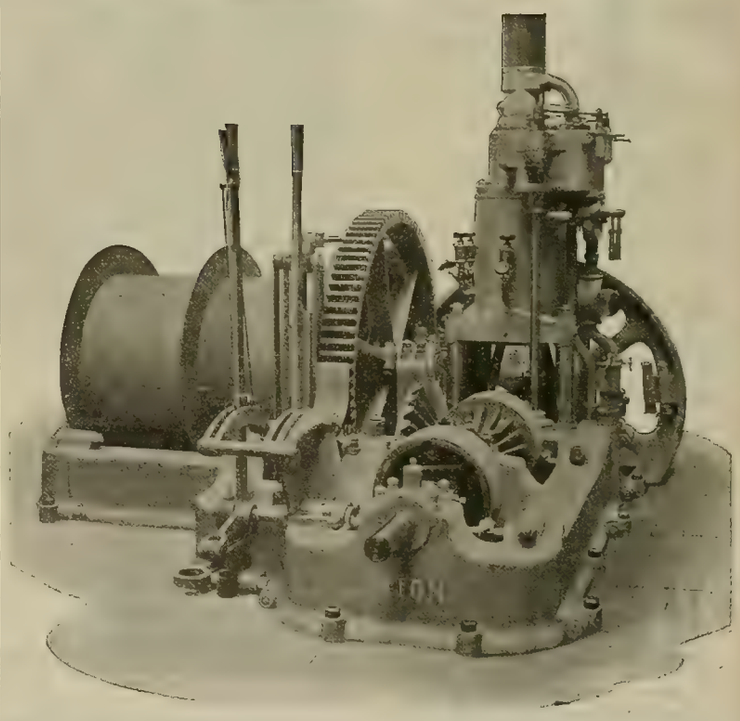
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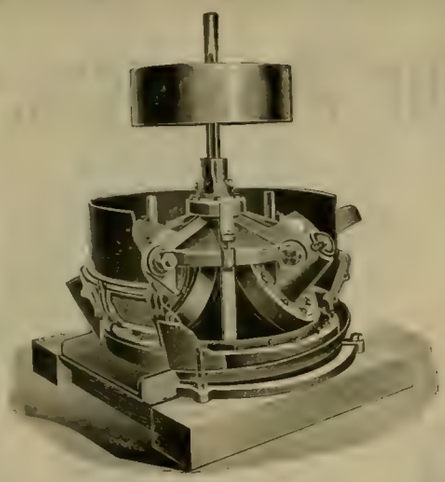
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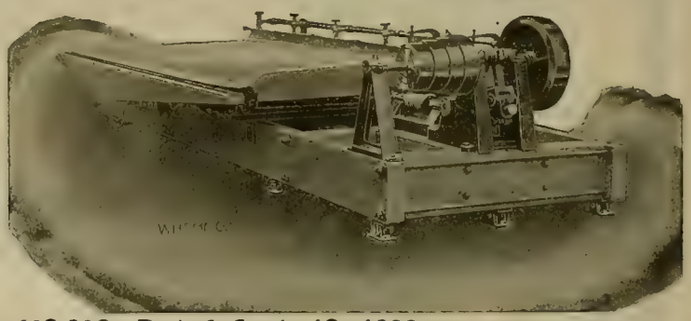
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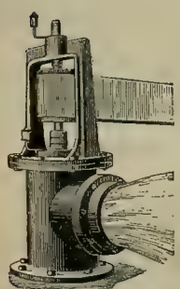
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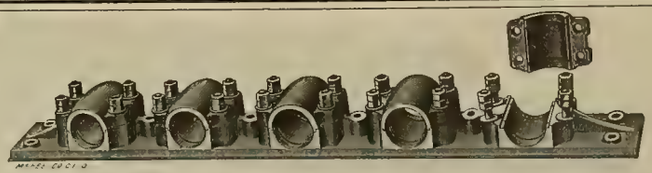


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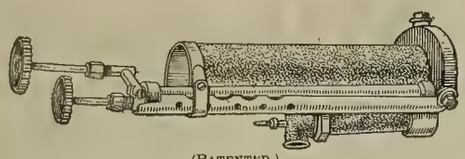
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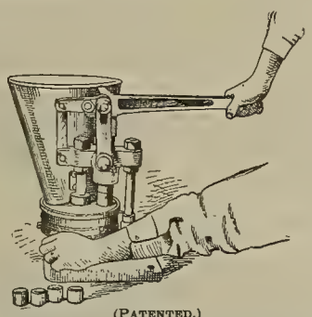
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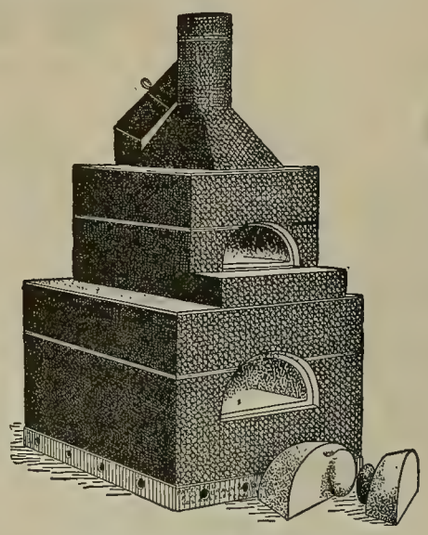
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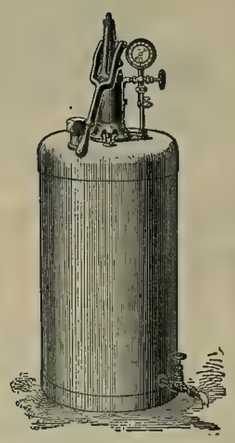
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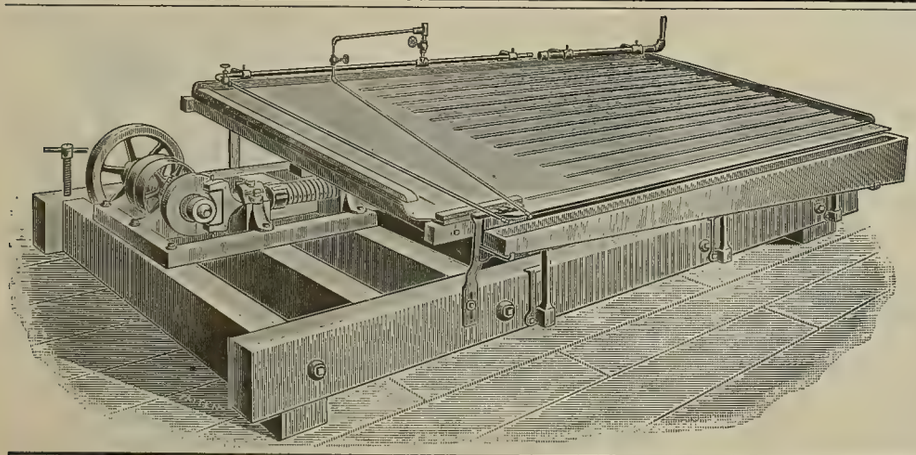
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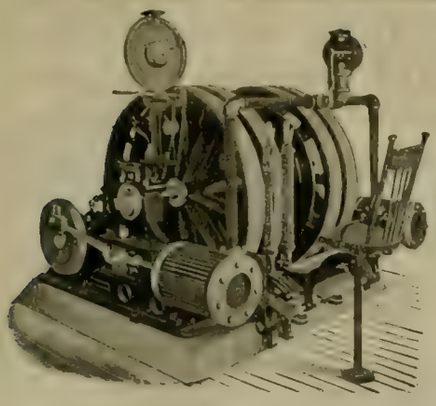
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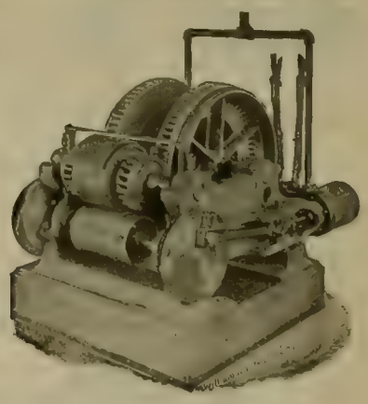
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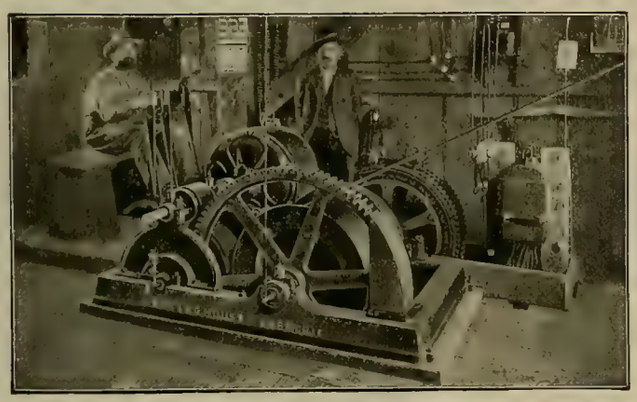
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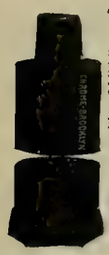
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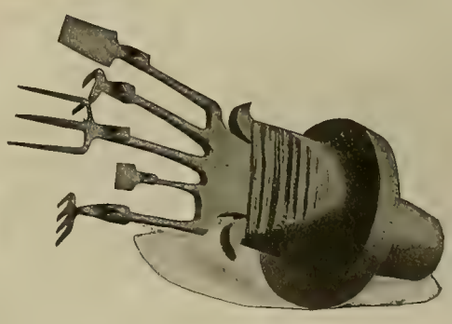
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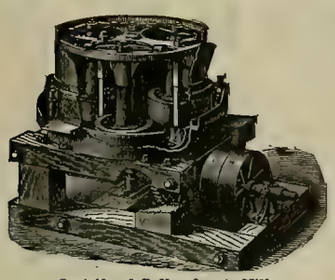
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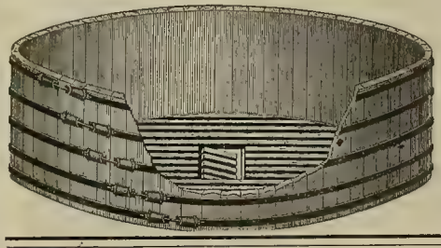
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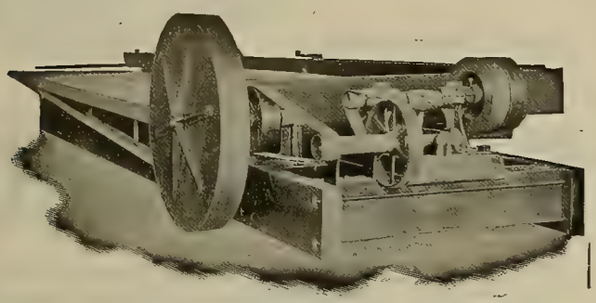
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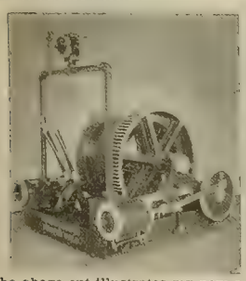
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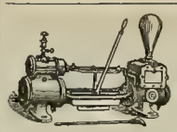
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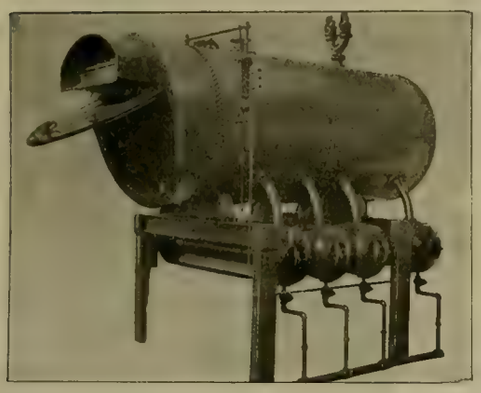
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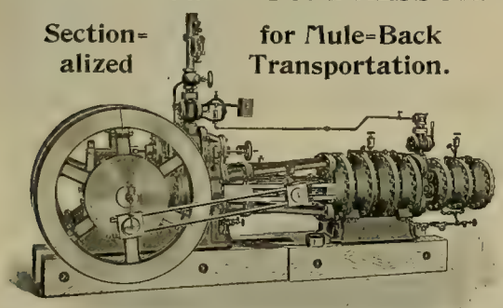
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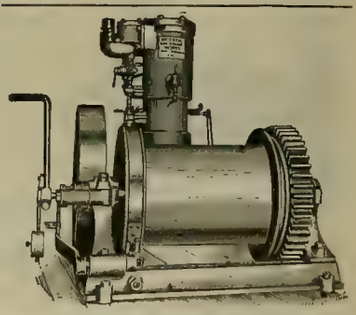
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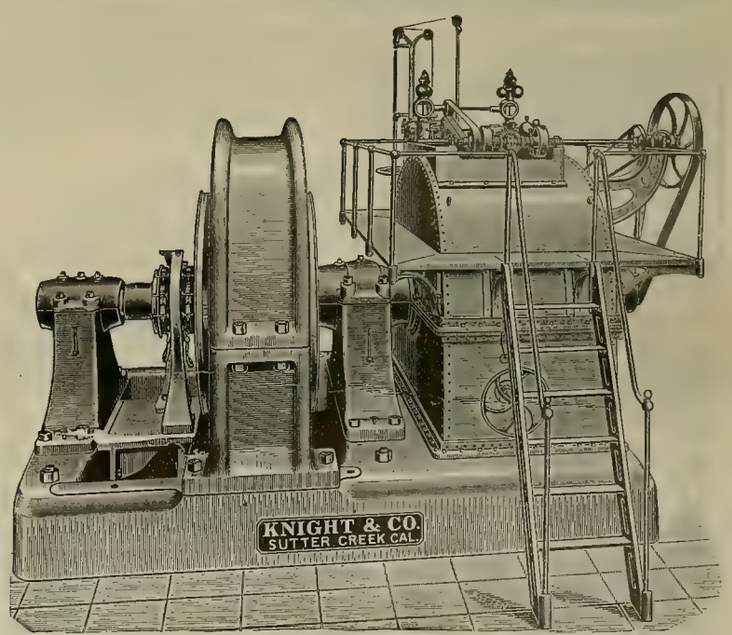
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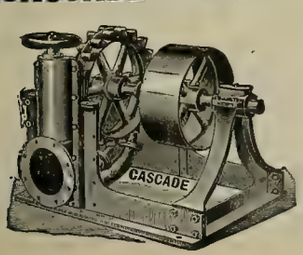
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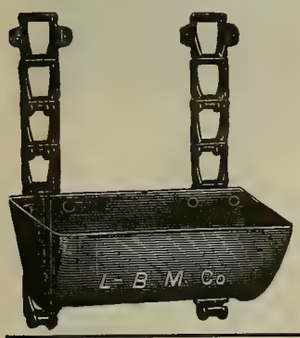


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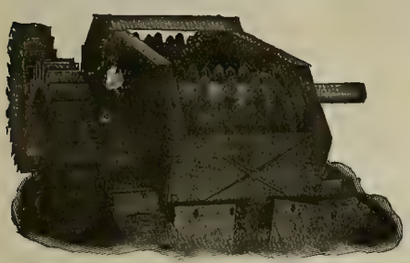
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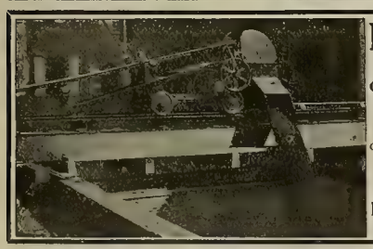


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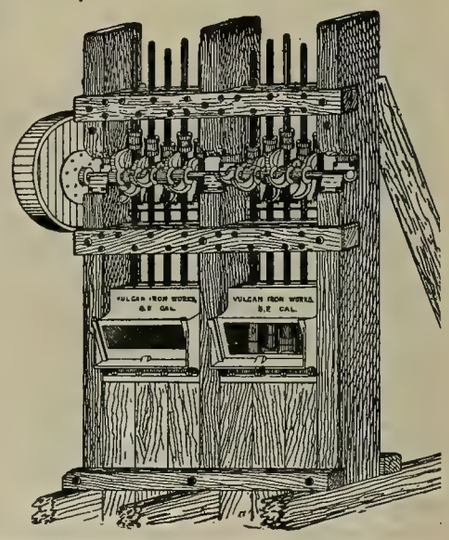
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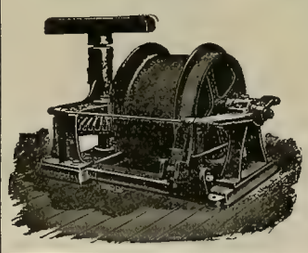
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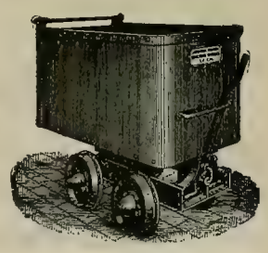
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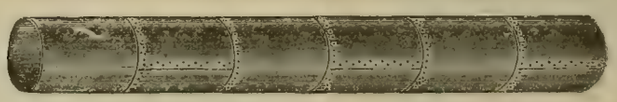
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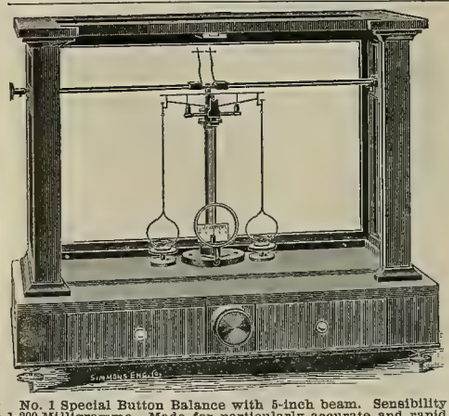
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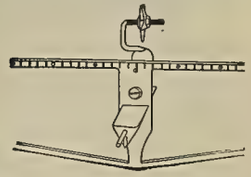
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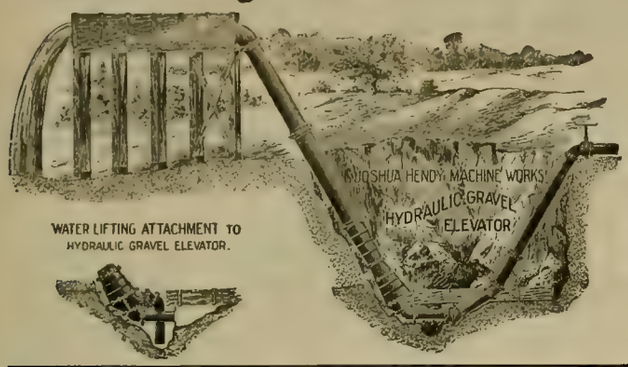
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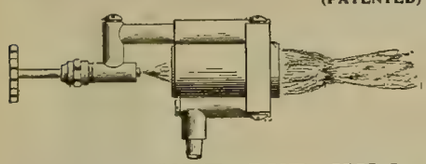
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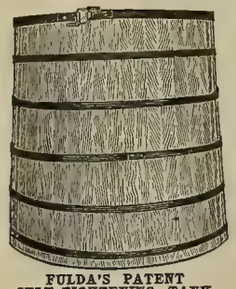
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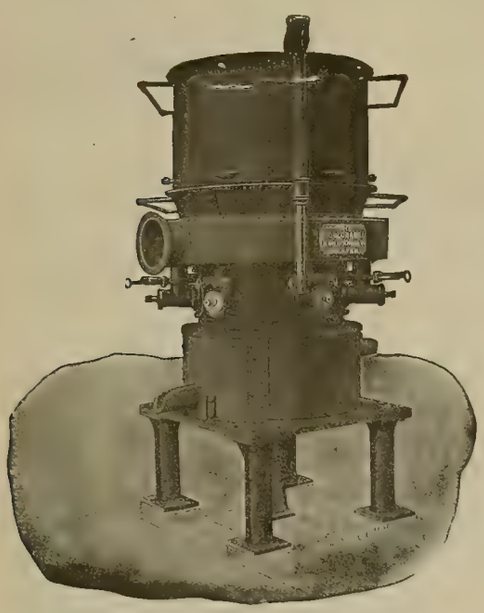
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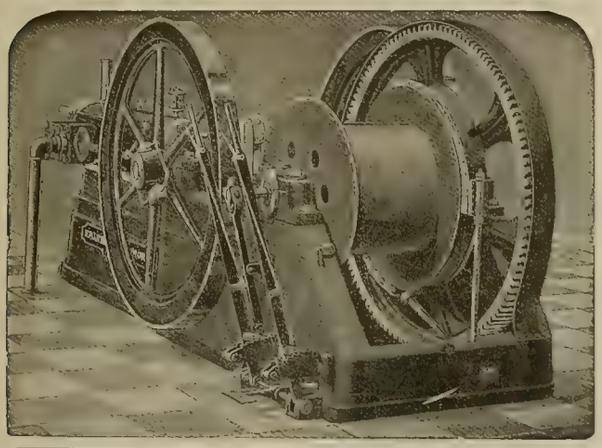
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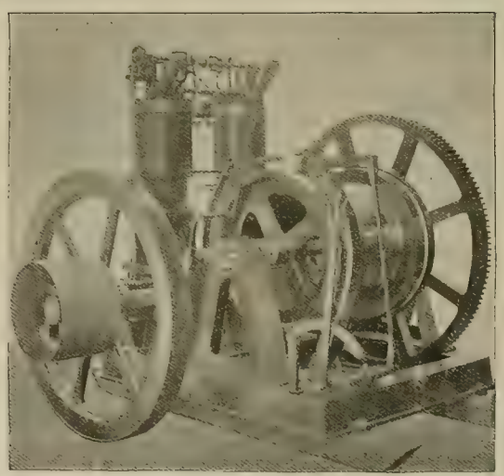
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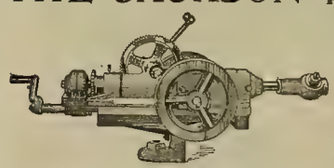
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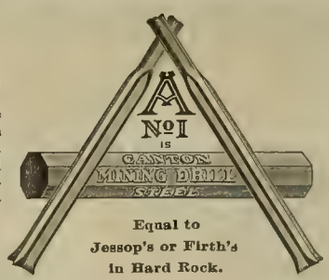
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ASSESSMENT NOTICES.

CALIFORNIA BORAX COMPANY. — Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1900, an assessment (No. 2) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of March, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, room 36, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 15) of Ten (¢10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of March, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 118) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on Tuesday, the 13th day of March, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of April, 1900, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 14) of 3 cents per share was levied upon the capital stock of the corporaiton, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 9, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of March, 1900, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 9th day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary

Office—320 Sansome street, room 9, San Francisco, California.



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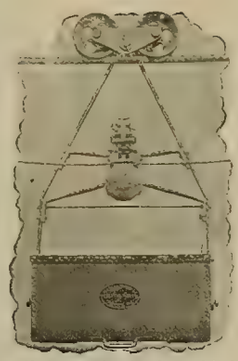
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DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 10) levied on the 4th day of January, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
F. F. Anthes	185	250	12 50
E. Hartmann	138	100	5 00
E Hartmann	201	650	32 50
H. H. Hartmann	143	75	3 75
H. H. Hartmann	150	25	1 25
H. H. Hartmann	202	400	20 00
A. Schwartz	152	250	12 50
B. Strueven	184	500	25 00

And in accordance with law, and an order from the Board of Directors, made on the 4th day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 773 Mission street, San Francisco, California, on MONDAY, the 5th day of March 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMPANY. — Location of principal place of business, 217 Sacramento street, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 22) levied on the 25th day of January, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
P. A. Wagner, Trustee	50	980	29 40
P. A. Wagner, Trustee	92	1,000	30 00
P. A. Wagner, Trustee	93	1,000	30 00

And in accordance with law, and an order of the Board of Directors, made on the 25th day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 19th day of March, 1900, at the hour of 2 o'clock P. M. of said day, to pay delinquent assessments thereon, together with costs of advertising and expenses of the sale.

CHAS. BOVONE, Secretary.

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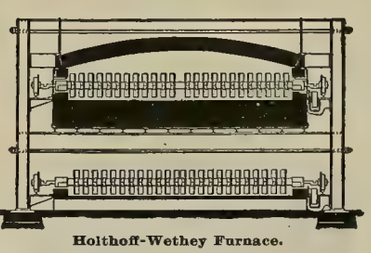
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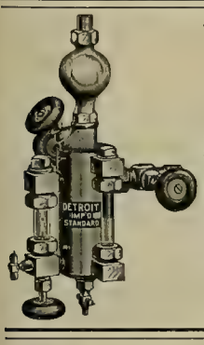
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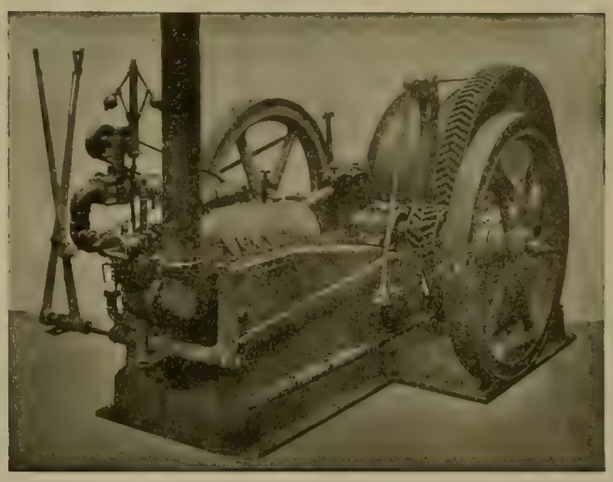
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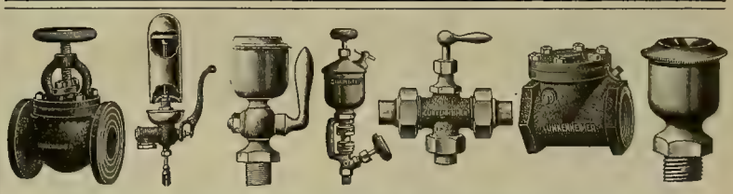
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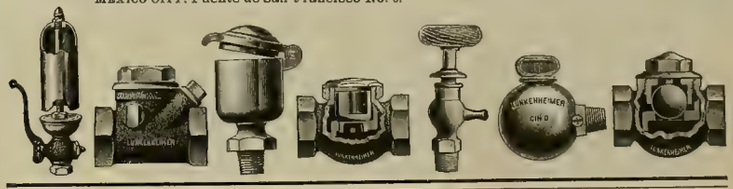


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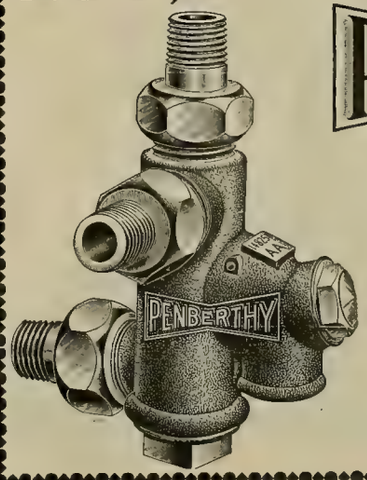
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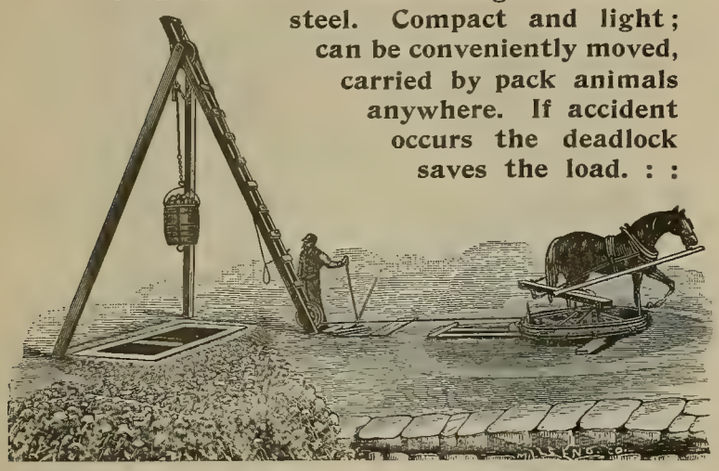
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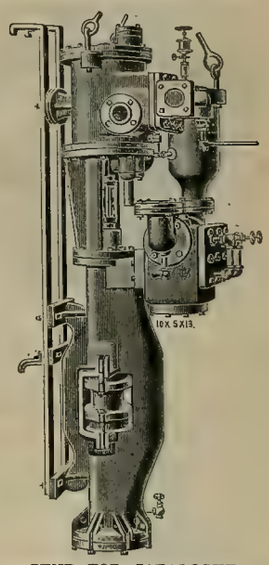
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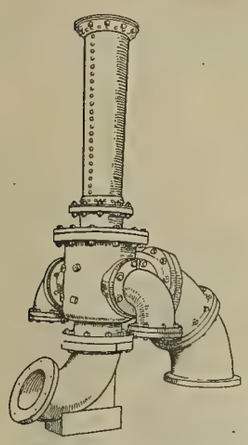
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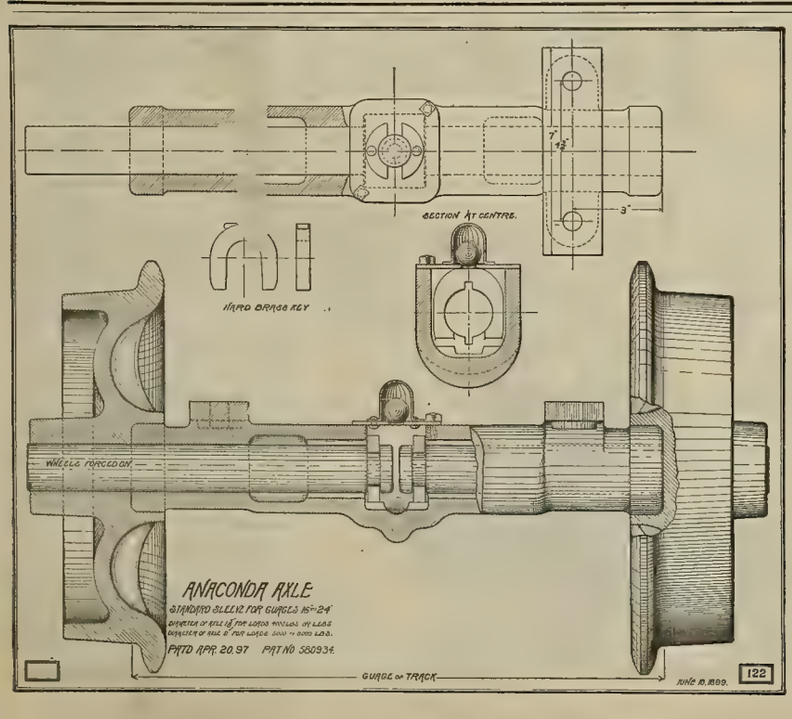
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AND PACIFIC ELECTRICAL REVIEW.

No. 2070. — VOLUME LXXX. Number 10. SAN FRANCISCO, SATURDAY, MARCH 10, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Hydraulic Mining in California.

About 70% of the $1,350,000,000 of California's gold yield to date has been from the placer mines, this sufficiently illustrating the magnitude of operations. Herewith appear some typical views of California hydraulic mining as it has been carried on: the old familiar giant, from which the solid stream issuing with tremendous force tears down the hillside. In its day the North Bloomfield, in Nevada Co., was the most extensive hydraulic mine in the world, and handled the material at a less cost per cubic yard of any of which authentic record is kept. In one year the North Bloomfield Mining Company washed 1,591,730 cubic yards of top gravel, which yielded three and eight-tenths cents per cubic yard. During the same period the company washed 702,200 cubic yards of bottom gravel, which yielded thirty-two and nine-tenths cents per cubic yard. The bottom gravel extended up from the bedrock 65 feet vertically. All above that to the surface was considered top gravel, varying in depth from 10 to 200 feet. All this was handled at a cost of less than two cents per ton.



North Bloomfield Hydraulic Mine, Nevada Co., Cal.

It was in Nevada Co. that this form of American mining had its origin, and at one time its greatest development. In Nevada Co., also, the first quartz-mining district in this country was organized and the first mining district laws regulating such mining were there adopted. At Dutch Flat, Placer Co., the Polar Star has a pipe line that carries 2000 inches of water. The district in which the Polar Star is operated has produced $20,000,000 in gold, and is still profitably productive.

The hydraulic mines in the northern part of the State go on unvexed by debris law restriction, and great sums are invested in pipe lines that in some places cross rivers on the principle of the inverted siphon. One across the Trinity river at Junction City, Trinity Co., has a 350-foot span, carries 3000 inches under 500-foot head, the cables upholding the supports being 620 feet long, 5 inches diameter, and weighing eleven tons each. At that point the La Grange mine, now considered the largest of the kind in the world, has a ditch that carries 9000 inches of water, a 30-inch steel pipe line ½-inch thick, 4850 feet in length, with a pressure of 450 pounds to the square inch. From where the water is forced across the stream, it is carried one and a half miles in a flume and thence through a mountain tunnel 8390 feet long, being again carried four miles through another flume. Here, as elsewhere, French capital has found profitable investment.



Polar Star Hydraulic Mine, Dutch Flat, Placer Co., Cal.

The water systems of California hydraulic mines such as here typified cost great sums of money. The Park Canal & M. Co. spent $2,000,000 on its plant; the North Bloomfield M. Co. similarly spent nearly $750,000; the Spring Valley & Cherokee in Butte Co., $500,000; the Phœnix Ditch Co., $880,000; the Smartsville, Yuba Co., ditch system, $1,000,000; the El Dorado Water & Deep Gravel M. Co., $600,000; the La Grange D. & M. Co., noted above, $450,000; and a host of others of equal magnitude, aggregating probably $100,000,000 invested in the greatest system of the kind ever devised.

This is but one kind of California hydraulic mining; drift mining is of equal importance to the surface work here so briefly noted, and, of late years, the system of gold dredging, now receiving such deserved attention.



In the Old Hayes Red Hill Mine on the Trinity River, Trinity Co., Cal., Now Belonging to the Compagnie Francaise Placers Hydrauliques.



Hydraulicking on the Trinity River Near Junction City, Trinity Co., Cal.

MINING AND SCIENTIFIC PRESS.

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THE attention of mining men everywhere is respectfully directed to the fact that this paper publishes each year a greater amount of original matter from men who are engaged practically in doing the things they write about than any other journal in the United States. This paper is the recognized medium of exchange of such practical information, furnishing helpful hints and practical points in mining and metallurgy written by men who from daily practical experience know just what they are talking about.

IN COMMON with others, Utah miners object to the recent ruling of the U. S. General Land Office, which requires that where the locator is trying to develop a group of claims by sinking a single shaft, he must do $500 worth of work on each claim before he can get a patent for them. It was held by the land office some time ago that there must be an aggregate amount of work done on a group representing $500 for each claim; that is, in the case of a man owning five claims, he would have to do $2500 in work—$500 for each claim—but could do all the work on one claim—before patent could issue. Now the land office goes further, and rules that while this may do in case of a tunnel, it will not suffice where a shaft is sunk, but that in such case $500 worth of work must be done on (not for) each claim. This is a singular distinction and bears hard and unjustly on a good many who have been trying to comply with all the new rules of the land office as fast as they are issued. It is such arbitrary rulings that furnish one of the best answers to the question even now occasionally heard: "What do the miners want of an executive department of mines and mining?"

The Value of Trade Catalogues.

The handsome catalogues issued by mining machinery manufacturers are worthy of continuous attention. They usually represent up-to-date devices explained and illustrated in a manner that makes their construction a matter of interesting information to any one who has anything to do with their use. While, of course, they are intended to secure sales of such goods, they also serve as current information of great value to miners, metallurgists and mining engineers. They represent the state of the art and the farthest present progress in such manufacture; they call the attention of every man who uses such things to details and improvements that are of great importance to intelligent workers. They add to and supplement the regular announcements of these manufacturers as found in our advertising columns, and are to be considered in connection therewith. A manufacturer can not always secure the space requisite to fully illustrate and describe his machinery, but in his catalogue he can elaborate and furnish the very information of immediate value to men needing precisely that particular device. The advertisements tell where machinery can be had. The catalogues supply extended and exact information about such machinery. These catalogues are also much more than the mere term "catalogue" would imply. They are really trade treatises, technical descriptions, valuable brochures of reliable information on the subjects they discuss. Many a "catalogue" received from a mining machinery manufacturer contains more information of real value to the miner than the contents of a poorly edited "mining journal" or other similar publication. Some of the foremost miners and mining engineers in the country have the commendable habit of procuring and filing for reference the catalogues of prominent mining machinery manufacturers, and in this way secure in fine form a vast and varied amount of technical data that is of daily value in their work.

Mining and Scientific Education.

After all, is it not becoming very clear that every line of mining and scientific advancement must proceed from wider knowledge and fuller understanding? Does not not every real reform in the condition of the miner, metallurgist or mining engineer, both in his own productive activity and in his relations with other activities and interests, depend for its realization upon more accurate knowledge and better trained reasoning and perception? Is it not a wonder, in view of what some miners do not fully and accurately know about their materials, conditions and environment, that they succeed at all? Of course these questions could as reasonably be asked about people in other callings and professions, but we are not dealing with them nor suggesting any comparisons with them. Their deficiencies do not atone for ours, though they undoubtedly make ours more tolerable—but that is another question.

The more that is accomplished in mining and scientific progress—and certainly there is much—makes it plainer that though there is no royal road to knowledge there is a kingly path away from it, leading toward all points of advancement. All the short cuts toward the elevation of the miner, socially, financially and politically, have yielded only disappointment and, too often, discouragement also. There have been efforts enough of this kind to show that, briefly speaking, it is learning that is needed rather than legislation: it is perception rather than political influence: it is wisdom which will win all that is desirable both in laws and positions, when all other preparations fail to attain them.

American experience during the last quarter of a century has furnished ample demonstration of the results of close investigation and hard thinking. Industries have been built up here with new materials, under new conditions, and the promoters have largely wrought out the opportunity and the demand which have made them profitable. Our miners have developed new and characteristic processes and something like eight hundred millions annual output to the State is the present measure of accomplishment. All this is the reward of wisdom. It is not the outcome of mere knowledge, because the knowledge itself had to be developed step by step as each line of mastery became essential to further progress. It is the work of the creative function of the human mind, which is inexpressibly higher than any accomplishment of the receptive faculties, which are its servants. It discloses the ability to see clearly and truly and to think logically and perseveringly. It is a triumph of education, and its testimony is valuable to us and to the world.

Our own industrial accomplishments are emphatic illustrations of the truth which the world is now coming to recognize as never before. Of course, the world's leaders have always known and enjoined it upon the people. It was left to this country as a priceless legacy from its foundation, for when Washington charged his followers to "educate the masses," he invoked the only agency by which the permanency of the republic could be secured. It is of universal application. The recognition of its applicability to mining progress has been deferred, but is now wide and clear. Mining education is now popular. Every mining school displays this fact in increased attendance and enlarged facilities; every intelligent and sincere mining publication feels the warmth of popular patronage and support; every educator of breadth and insight sees that the common schools must provide effectively and earnestly for training of the young along lines which minister to elevation and which promote appreciation of the opportunities in mining and scientific progress. There are now discernible a spirit and a purpose in these matters which are new with this generation.

Such education is accepted now as a statesmanlike effort. During the last two decades special commissions in all civilized countries, charged to inquire into industrial conditions, have reached the same conclusions, viz., that while legislative reforms are essential, and they naturally differ in different nations, there is an underlying principle which is the same in all of them, and that is that the advancement of any class, in their own arts and in their relations to other elements of population, must be chiefly attained by systematic and liberal provision for education. That this is the universal need and its demonstration, as the result of the fullest investigation and the ripest thought of those who can see most deeply into existing conditions, is indisputable. So important is the matter that it is no longer a plea for the miner in his own behalf; it is a demand by statesmen in the interest of national strength and progress. The miner need no longer feel that he is a clod by the roadside along which national pageants pursue their courses. He is borne aloft as the holder of the key of the world's well being. The victories of peace and war, the achievements of commerce, are largely dependent upon his success; in fact, the whole fabric of civilization must be woven from the materials which he must supply by acts of higher intelligence than have ever been hitherto required.

A Standard Ohm.

Should an International Congress of Electrical Engineers be held during the coming Paris Exposition, it is to be hoped that steps will be taken to standardize the ohm, i. e., to adopt some one standard unit of resistance. We have a standard volt and a standard ampere, and why should we not have a standard ohm for theoretical, if not necessarily for practical, exactness in the electrical field? Instead, there are in existence to-day four standards for the unit of resistance, viz.: The "legal" ohm, the "international" ohm, the "British Association" or "B. A." ohm and the "Siemen's" ohm.

The "legal" ohm was adopted by the International Congress of Electrical Engineers held in Paris in the year 1884. As adopted, the "legal" ohm was made equal to the resistance offered to flow of electricity (unit flow under unit pressure) by a column of mercury one square millimeter (0.03937 inch, or a small fraction less than $\frac{1}{25}$ inch) in section and 106 centimeters (0.4173+ inch) in length, the temperature being at the freezing point (32° F. or 0° C.) and the pressure of the air being equal to the pressure at the base of a column of mercury 760 millimeters (30 inches) in height. The "international" ohm was adopted by the International Congress of Electrical Engineers, held during the World's Fair at Chicago in the year 1893. The unit adopted was the same in every respect as the "legal" ohm, except that the length of the mercury column was changed to 106.3 centimeters (0.4185+ inch). This unit is not generally used, however. The "British Association" or "B. A." ohm was determined at London in the year 1863 by a committee appointed by the Association upon the same basis as that upon which the "legal" ohm was afterwards calculated or determined, i. e., upon what is called the C. G. S. (Centimeter Gramme Second) system—in fact, the Paris unit is really a correction of the "B. A." unit. The latter is smaller than the "legal" ohm, the actual proportion being 0.986 to 1.0.

The "B. A." unit is largely used in Great Britain. The "Siemen's" ohm is equal to the resistance offered to flow of electricity (unit flow under unit pressure) by a column of mercury 100 centimeters (0.3937 inch) long, the other details as to size, temperature and pressure being the same as those used in determining the "legal" ohm. The "Siemen's" ohm is largely used throughout Europe. The only thing necessary in the adoption of a standard ohm would be to fix upon some uniform and universal standard of length for the mercury column—a present necessity for international convenience.

Concentrates.

NO INSULATOR of magnetism is known.

AN explosion of gasoline gas mixed with ten parts of air will give an initial pressure of 150 pounds per square inch.

WITH a 125-foot head a nozzle 4 inches in diameter will discharge 7.28 cubic feet of water, 364 miner's inches, per second.

ANY galvanometer, having a resistance which is large in proportion to the current to be measured, can be used as a voltmeter after calibration.

TO FIND the approximate number of gallons of water raised by a pump per minute at 100 feet piston speed—square the diameter of water cylinder and multiply that by 3½.

DRY STEAM is obtained by such construction of the boiler that steam alone shall rise above the water surface without carrying up with it any of the water from which it is generated.

THE density of air in a shaft or depression four miles below sea level would be equal to that of water. There a cubic foot of air would be just the same weight as a cubic foot of water.

THE strength of the solution in each cell of storage battery should be tested with a hydrometer once a month. When the battery is fully charged, it should indicate 22° Baume.

ALUMINUM has the least electrical resistance for a given length and weight and mercury has the greatest; but for a given length and sectional area, annealed silver has the least resistance and bismuth the greatest.

IN laying out the holes in a belt for the lacing, do not get them too near together, for while this practise makes the finished lacing stronger, it makes the belt weaker, on account of the large amount of material cut away in making the holes.

AN Amador county, Cal., mining superintendent, sending $12 and the names of four of his colleagues to whom he wishes to have this paper sent for a year, says: "We in this section appreciate your paper very much, and look to it as authority and a publication of solid worth, deserving the support of any one engaged anywhere in the mining and milling of ores."

A "HEAT UNIT" means the measure of heat required to raise the temperature of one pound of water 1°. The latent heat of water is equal to 143 units of heat; that is, it requires one pound of nearly boiling water to melt a pound of ice, and then the pound of water from the ice will conceal or hide the extra heat, and, at the end, the two pounds of water will be at 32° F. the temperature of ice.

J. K. HARDY of Chicago, Ill., rises to say that he has spent most of his life in the study of metallurgy, and that he has discovered a process by which he produces from lead a metal that has all the chemical and mechanical qualities of tin. Incidentally, he also makes a product of copper, so hard that it may be used in car journals. He and "Argentaurum" would make a good combination.

ONE pound good coal evaporates six to eight pounds water (average boiler); two and one-quarter pounds dry wood are equivalent to one pound good coal; one cord of wood, 128 cubic feet, contains 72 cubic feet solid wood; weight of dry pine (Pacific coast), per cubic foot, about thirty pounds; 1970 pounds Scotch Splint coal are equivalent to 2250 pounds Wellington coal, or 2500 to 3000 pounds California coal.

A BAROMETRIC READING of 20.9 inches indicates, approximately, an altitude of 10,030 feet above sea level and an atmospheric pressure per square inch of 10.26 pounds. The height of the barometer in inches multiplied by .4908 equals the atmospheric pressure in pounds per square inch. The barometer showing 22.2 inches indicates, approximately, an altitude of 8350 feet and an atmospheric pressure of 10.9 pounds per square inch.

ON an inclined plane the strain on a hoisting rope with a load of 2000 pounds varies, of course, with the elevation. With an inclination of 40 feet in 100 feet the angle of inclination would be 21° 50′, and 2000 pounds on the rope would produce a strain of 735 pounds. At that inclination a load of 3500 pounds, including weight of rope, would induce a strain of $\frac{735\times3500}{2000} = 1286.25$ pounds.

IN Colorado the origin of placer gold is ascribed to glaciers that mined the gold-bearing rocks on a gigantic scale, carrying the debris into the canyons and dumping it in their moraines along the sides, where, subsequently, floods and streams sorted and rearranged those piles, the gold being distributed through the mass of material by gravity, finding its way down to bedrock. In South Park paying placer ground is found 10,000 feet above the sea.

PURE iron is almost white in color. Pure uranium is even whiter than iron. It can be filed with ease, and does not scratch glass. It is made yellow by the presence of nitrogen. It is not magnetic and is more volatile in the electric furnace than iron. In a state of powder it burns in fluorine, forming a green fluoride. It burns in oxygen at a temperature of 170° C., combines with nitrogen at 1000° C., and decomposes ammonia at a red heat.

HISTORY furnishes records of the working of the copper mines of Sinai from about 5000 B. C. to 1200 B. C. These possessions brought on several bloody wars. The scepter of Pepi II, of the sixth Dynasty, is preserved in the British Museum. The entrance, the ruins of the furnace, the crucibles, the huts of the miners, and some fragments of tools still exist. In the debris have been found remains of furnaces and crucibles, slag and cinders.

AS BETWEEN tunneling and sinking to strike the vein, the advantage, ordinarily, lies with tunneling. The tunnel is self-draining; it needs no hoisting machinery; the cost per foot is less; timbering is easier provided for. Where the enterprise is not on an unusually large scale, and the distance is not over 3 feet of tunnel to 1 foot of shaft sunk, the tunnel is deemed preferable. Of course, special circumstances govern every case and no general rule can apply.

ZINC-POTASSIC CYANIDE is a solvent of gold, but of a lesser power than potassic cyanide alone. It is not decomposed by alkali into free potassium cyanide and potassium zincate. In presence of potassium cyanide it can have no solvent action on gold, and consequently is valueless in the ordinary cyanide process. A test with silver nitrate in presence of potassic hydrate does not show the cyanide available as a solvent of gold, but the total amount of cyanogen in the solution.

TO AMALGAMATE a new copper plate many miners first rub it with extremely fine brick-dust, or very finely sifted wood ashes, then rubbing it briskly with a woolen rag dipped in dilute nitric acid—one part acid, nine parts water—until thoroughly polished, then repeatedly washed in clear water. A solution of cyanide of potassium may then be applied, after which prepared quicksilver is put on until the entire surface of the plate is thoroughly coated and is bright, soft and sensitive to the touch.

ACETYLENE GAS is a combination of hydrogen and carbon, and is the product of the decomposition of calcic carbide and water. Calcic carbide is the combination of calcium and carbon and is a product resulting from the action of the heat of the electric arc on lime and coke. A short ton of calcic carbide, 95% pure, may be counted on to produce 10,000 cubic feet of illuminating gas with tenfold the brightness of ordinary illuminating gas. San Francisco gas costs the company 48 cents per 1000 cubic feet.

A COLUMN of water having at its base a pressure of 400 pounds to the square inch, gives the same aggregate force as another column of water where the pressure is 204 and the area 49. A column of water 5 inches in diameter and 921 feet high is equivalent in total pressure to a column 7 inches in diameter and 469 feet high. The principle of pumping by hydraulic power is the transmission of the pressure of water from a high level to a pump motor at a lower point for the purpose of raising a larger quantity of water against a less pressure.

THE square of the velocity of the wind in miles per hour, divided by 200, gives the force of the wind in pounds per square foot. To have a man and a parachute weighing 300 pounds alight with a uniform velocity of 16 feet per second, the parachute should be 25.1 feet diameter—(16 feet per second is 11 miles per hour: $\frac{11^2}{200} = \frac{121}{200} =$ .605 pound pressure per square foot; $300 \div .605 = 495.86$ square feet. That is "square feet;" the parachute being circular, $\frac{495.86}{7854} = 631.35$ area in "circular feet;" $\sqrt{631.85} = 25.1$ feet, diameter of parachute).

TO DETERMINE the horse power necessary to drive a given number of stamps in a battery, one way is to multiply the number of stamps by the weight of each, and this product by the number of drops per minute, and again multiply this last product by the number of inches space through which the stamps are to drop; this last product is then to be divided by 12, and that quotient by 33,000. The last quotient should give the horse power—theoretical—required. Example: with ten stamps, weighing 950 pounds each, dropping 100 times per minute through 6 inches space, $10\times950\times100\times6\div12=475,000\div33,000=14.4$ H. P. It would be safe to add 25%, which would make required horse power about 18.

SANDSTONE has a singular effect on drill bits. Though sandstones are usually soft, the bits cannot be finely pointed, but, on the contrary, should be flattened. A bit with a knife-edge when used in sandstone will have its edge sharpened like a razor, the faces of the bit gradually becoming concave. This is natural, because, as the bit imbeds itself in the grit of the rock, it is rubbed as though on a grindstone. The stone is not usually hard enough to dull the sharp line of the edge, so that the more this bit is used the sharper it gets. It can not, however, be used very long, because the point or outside ends of the bit become flattened and dulled, and, what is a still greater objection, the ends become tapered. All this arises from the hard work and the great rubbing experienced at the walls of the hole.

ONE gallon of gasoline produces from 60 to 80 cubic feet of vapor, according to the temperature and density of gasoline. From five to six volumes of air per volume of vapor is used, and even twelve volumes is claimed as the most economical mixture of air with gasoline vapor for explosive power effect. The explosive pressure varies with the ratio of mixture of air and vapor, and also with the ratio of charge volume to the volume of the cylinder; in practise it varies from 90 to 150 pounds per square inch. Compression, as in the four-cycle engine, adds its own pressure to the explosive effect and increases the mean piston pressure in a large degree. The theoretical pressure is somewhat greater than the actual pressure, owing to the uncertainty of perfect mixture in the gases and undefined limit of absorption of heat in the cylinder walls.

THE barrel used in the modern chlorination process consists of a heavy plate steel shell, with cast iron heads, provided with trunnions, on which the barrel slowly revolves. To one of these heads is bolted a spur gear, driven by a pinion carried by a countershaft, which in turn is driven either by friction gearing direct from line shaft, by belt and friction clutch pulleys, or by slack belt and tightener. A brake stops the barrel at any desired point. The barrel has two manholes with covers for charging, suitable inlet and outlet pipes and valves for the solution. It is lined with chemical sheet lead, and has an internal filtering diaphragm. The filter consists of a sheet of perforated lead, supported on wooden segments, covered with a sheet of asbestos cloth and the cloth with a wooden grating, the whole being held in place by wood cross beams. A five-ton barrel is 62 inches diameter, 8½ feet long, and weighs about 20,000 pounds.

THE Bessemerization of copper matte spoken of in last week's issue in the account of the California Copper Co. at Madera, Cal., applies the principle of the Bessemer converter to the desulphurization of copper matte. The process depends, primarily, upon the production of its own heat by the combustion of those ingredients of the matte which it is intended to eliminate, principally sulphur and iron. The oxidized sulphur escapes as sulphur dioxide. The oxide of iron formed must be provided with silica to form a fusible slag. The kettle or converter in which the operation is conducted is lined with a siliceous material, which is rapidly corroded by the fluxing action of the oxide of iron. After a limited number of charges have been blown in one kettle it must be removed for repair, and be replaced by another. A converter holding one ton of matte, if it contain 50% copper, may be blown into copper in an hour. A low pressure blast is used successfully. The Copper Queen, Arizona, affords a good example of practical work of this nature. Where such Bessemerizing plants as those at the Copper Queen or Anaconda, Montana, are in operation, a change in methods has been suggested, viz., arrest the Bessemerization when the molten regulus has reached the white metal pitch, say at 75% copper, for up to that pitch no loss of valuable metals takes place, crush this white metal, calcine a portion, mix with raw, and charge the mixture into a refinery furnace to make refined copper, instead of continuing the blowing upon the metal in the converter until it comes to copper, and charging this copper into the refinery furnace to make refined copper.

CONCERNING damages in case of such disaster as that resulting so fatally at the Mountain Copper Co.'s property in Shasta county, Cal., on the 1st inst., nothing is at present to be said. In the case of Finlayson vs. Utica M. & M. Co., 67 Federal Reporter, 507, in the 8th U. S. Circuit Court of Appeals, the "rule of safe place" was thus laid down: "The doctrine that a mining company can send its employes into the bowels of the earth to conduct the mining operations, without making any provision for the proper supervision and inspection of the mine for the security and protection of the miners and the mine, is unsupported by authority, is opposed to sound public policy, and is cruel and inhuman. Miners do undoubtedly take upon themselves all the ordinary and usual risks of the business. These ordinary risks are the risks incident to the business when it is conducted by the mine owner according to the customary and approved methods and with due regard to the safety of the miners. The neglect of the mine owner to discharge his duty in this regard is not one of the risks assumed by the miner, but is a negligent act on the part of the mine owner which renders him liable to damages to any miner injured thereby. It is the duty of the mine owner to provide a competent foreman or inspector to superintend the working of the mine; it is the duty of this foreman to direct the miners when and where to work; and it is particularly his duty to make timely inspection of the timbers and walls and roof of the mine in order that no harm may come to the miners from causes which a capable and diligent inspector would discover, and, when discovered, remove or cause to be removed. Where blasts are used in a mine, it is the imperative duty of the foreman to be diligent in discovering the effect of the blast upon the timbers, walls and roof of the mine, and to point out to the miners any dangerous conditions resulting from the blast, and to cause these conditions to be removed without delay, by proper appliances and with as little danger to the men as practicable. Mining is a necessary and permanent business, and must be conducted in an intelligent, orderly and systematic manner, not alone for the protection of the miners, but for the preservation of the mine itself. For these reasons, the business must have an intelligent and competent head. The necessity for this is imperative. When properly conducted, there is no pursuit in the country carried on with greater regularity, system and order, and with a stricter observance of rules intended to secure employes against accident and property from loss or damage. The conditions confronting the miners from day to day, as a rule are neither unexpected nor unusual. They are the common and expected incidents of mining, and, when the foreman does his duty, they are provided for and met without accident or any special danger. There is nothing hasty or haphazard about the business."

Notes on Ore Dressing.

NUMBER II.*

Written for the MINING AND SCIENTIFIC PRESS by A. W. WARWICK.

CRUSHING.—The crushing of an ore, as a preliminary to the separation of its constituent minerals, should be conducted in such a manner that each mineral may be detached from any other adhering or enclosing mineral or rock; the minerals, however, should not be broken down to any finer size than is absolutely necessary. An ideal crushing plant would set loose each mineral from any other and yet each would retain its original size and shape. The nature of the material to be treated will, however, not allow even a close approximation to this ideal.

The machinery used to effect the crushing may conveniently be divided into the following classes:

1. Coarse crushing: (a) stone breakers of reciprocating type, e. g., Blake's crusher; (b) stone breakers of gyratory type, such as Gates and Comet; (c) rolls.

2. Fine crushing: (a) high speed, belted rolls; (b) gravitation and steam stamps; (c) horizontal roller mills, such as Huntington and Griffin mills.

It need hardly be pointed out that these machines are seldom used alone. Generally two or more are used in combination, and in this connection it may be said that the arrangement is fully as important as the choice of the machines. The crushing department of the average mill is the one most open to criticism, and there is no doubt that the greatest cause of avoidable losses is to be found in the excessive crushing. The arrangement usually adopted is much as follows:

1. The ore is dumped over a grizzly with say 1½-inch spaces.

2. All stuff too coarse to go through the bars is crushed by a Blake to 2-inch cubes.

3. The fines from the grizzly and the product from the rock breaker are crushed together in a set of rolls.

4. The product from the rolls is screened to the desired size; the fines are passed on for treatment and the coarse is

5. Either returned to the rolls or goes to a second set.

The general result of this treatment is to obtain a mixture, a portion of which is of the size desired, but most of it finer than is necessary. A good deal is so fine that it is exceedingly difficult to save the values. The tendency is, however, to give more consideration to the question of crushing. It is becoming more generally recognized that it is absurd to break mineral down to a fine powder and then to introduce machinery to save it.

Two general principles may be laid down: (1) The best system of crushing is the one that produces the smallest amount of stuff finer than is desired; (2) each ore requires a different mode of treatment, sometimes radically different and sometimes differing only in detail.

Before considering the machines, the character of the work to be done may well be investigated, thus following out the old precept of being able to arrange and choose the machinery to the ore, instead of vice versa.

From the point of view of crushing, ores may be conveniently divided into four classes: (1) The minerals are coarse and easily broken apart; (2) the minerals are finely disseminated through the matrix, but the valuable minerals are not intermixed; (3) the minerals are coarse or occur as masses in the matrix, but the valuable minerals are closely associated; (4) the minerals to be saved are finely disseminated through the matrix and are also closely associated with each other.

The character of the crushing required for each class is obvious. Of course, the finer the minerals and the more closely they are associated the finer the rock must be crushed to unlock them. Every case requires separate and careful consideration, and it may here be pointed out that examination of small samples is worse than useless. The ore should be examined either in place in the mine or in bulk as it is broken by the miners and as it may be sent to the mill.

Besides the coarseness, etc., of the mineral, other considerations have to be taken into account. The most important of these is the varying frangibility of the minerals. It is unfortunately the case that most of the valuable minerals are very fragile as compared with the accompanying gangues. A familiar case is quartz and galena. The minerals on going through a crushing machine are both subjected to the same treatment, with the result that the soft, fragile galena is broken up very finely as compared with the hard, tough quartz. Cases the direct opposite of this are known. The writer once examined a sandstone impregnated with native copper. Several hundred pounds were crushed to a 16-mesh screen and the product sifted successively through 25, 30, 40, 80 and 100-mesh sieves. Each product was weighed and analyzed with the following results:

	Mesh	Per ct.	Copper, per ct.
Ore between	25 and 16	14.2	18.6
Ore between	30 and 25	25.3	22.5
Ore between	40 and 30	18.6	4.2
Ore between	80 and 40	22.9	3.5
Ore between	100 and 80	10.4	3.0
Ore finer than	100	8.6	3.1
		100.0	

In this case the filaments and scales of copper were flattened out to a large extent, and by far the greatest percentage was found in the coarse material. Such cases as this are, however, rare.

This difference in frangibility of minerals is sometimes taken advantage of for their separation. At Lintorf,† Germany, a product is obtained from the jiggers composed of about half zincblende and half iron pyrites. This material was passed through a Vapart disintegrator, and by screening the crushed material an enhanced value was obtained. This machine takes advantage of centrifugal force in order to crush; a horizontal plate revolves at a high speed and the material referred to was fed to the center. The particles are hurled off the plate tangentially and strike a ring that encircles the plate at some distance from it. The impact causes the minerals to fracture, chiefly along the cleavage planes. At Lintorf it was found that when the plate made 350 revolutions per minute the zincblende only was broken, but that on increasing the speed to 800 revolutions the pyrites were broken to grains of 1½ to 1½ mms., while the blende was reduced to an impalpable powder. On screening out the fines, it was found that they contained 50% zinc. Before treatment, it was difficult to get a market for the mixed pyrites and blende even at about $2.50 per ton, but, on treating as described, 2000 pounds of material gave the following returns:

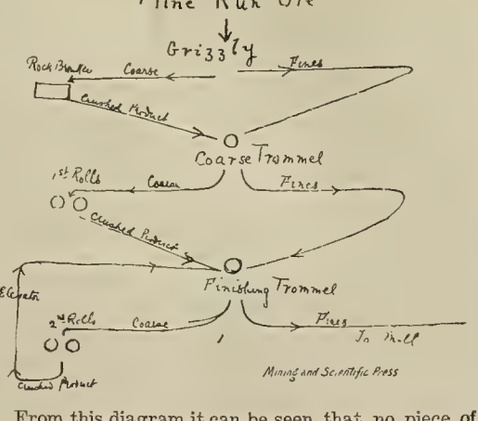
1100 lbs. pyrites containing 5% zinc, value	$2 30
900 lbs. blende, 50% zinc, value	7 75
Total value	$10 05

The cost of treatment was about 20 cents per ton.

In by far the most cases the difference in frangibility works against the operations of ore dressing. The fines contain the most values, and at least 80% of the losses incurred in the entire mill incur in treating the fine stuff.

It is not important, therefore, to arrange the crushing plant with a view of decreasing the fines. The most generally adopted plan, when the question is given consideration at all, is to crush the ore in stages and to remove at each stage the product already reduced fine enough.

In carrying out this system the machinery usually adopted consists of stone breakers and rolls, although of course any suitable machine may be used. The diagram given below represents a gradual reduction process in its simplest form; of course, the stages may be multiplied, but, beyond a certain point, it may be doubted if there is any advantage to be gained.



From this diagram it can be seen that no piece of ore is crushed unnecessarily; the grizzly removes the fines from the mine ore before the latter receives its first crushing; the coarse trommel takes out the fines before the roughing rolls receive the coarsely-crushed ore, and finally the finishing trommel takes out all the ore crushed fine enough before being sent to the last set of rolls. As a result, each machine is relieved from unnecessary work, so that the output of the entire system is increased, and the amount of fines made is greatly reduced. Without considering the mechanical principles involved and the obvious advantages and disadvantages, there can be no doubt that the work done by a gradual reduction crushing plant is far better than in the system in which one crusher feeds another directly without intermediate screening.

The old system, however, still obtains to a great extent and is well exemplified by the mills at Bonne Terre, Mo., described by Munroe. In this case the ore consists of magnesian limestone carrying galena and is of easy crushing character. The screen used has 6 millimeter round holes and the finished composition:

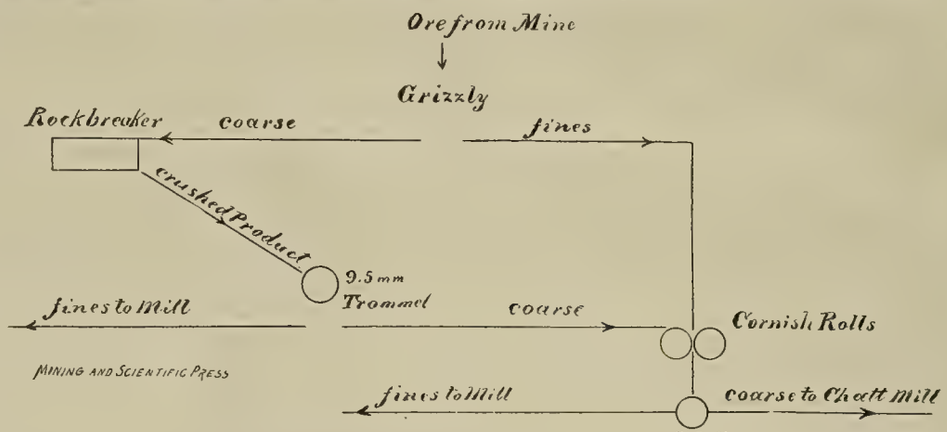
Between 4 and 16 millimeters	2.0%
" 1 and 4 "	41.0%
" ¼ and 1 "	27.0%
Finer than ¼ millimeter	30.0%
	100.00%

In this case we see that about one-third of the ore was reduced to slimes and Munroe's paper shows the embarrassment and loss occasioned by this large proportion of slime.

Some years since, the writer inspected a mill near Hayden Bridge, Northumberland, England, that had a modified gradual reduction plant. A series of tests were made on the crushed product and a much better showing was made than that given above. The ore was crushed to a 9.5 millimeter screen and consisted of galena associated with baryta spar and limestone. The average of several sets of screenings gave the following results:

Ore between	5 mm.	and	9.5 mm.,	15.5,	percentage lead,		2.3
" "	3 "	"	5 "	28.25,	"	"	3.5
" "	1 "	"	3 "	18.75,	"	"	4.7
" "	½ "	"	1 "	25.5,	"	"	4.6
Finer than ½ mm				15.0,	"	"	7.2

The crushing plant used at this mill may be shown diagramatically as below.



The operations were:

1. The ore was screened over the grizzly with 3-inch spaces: the coarse went to a 12x8 Blake and the fines to a set of Cornish rolls.

2. The product from the rock breaker was screened in a 9.5 mm. trommel; the fines went to the washing machinery and the coarse to the Cornish rolls.

3. The stuff from the rolls was screened in a 9.5 mm. trommel; the fines going as before to the mill, while the coarse went to a special portion of the mill, known as the chatt mill, for special treatment.

As a result of this system of crushing a product was obtained amenable to the after operations. It will be noticed that this is not a perfectly arranged plant. At least 27% of the fines from the grizzly would have gone through a 9.5 mm. screen and hence this latter should have been removed.

(TO BE CONTINUED.)

INVESTIGATION of the causes, effects and means of prevention of forest fires in the West will be carried on this summer in Washington, Oregon, California, Arizona, New Mexico, Utah, Colorado, Wyoming, Montana, Idaho and South Dakota. Besides field study, designed chiefly to discover means of preventing the evil, the Division is making a historic record of all important fires which have occurred in the United States since 1754. Although yet incomplete, this indicates that the annual recorded loss by forest burnings in the United States is, at the lowest, $20,000,000. It will probably run far above this sum, as the Pacific Coast States have been only partially examined. Accounts of over 5500 disastrous fires have been obtained in the seventeen States already examined. Michigan, Minnesota and Wisconsin have suffered the most severely. These records are taken chiefly from newspapers; and where it has been pos-

*No. 1 of this article appeared in the issue of Jan. 13, 1900.

†See F. Buttengbach—Berg und Huttenmannischen Zeitung, vol. 41, p. 153. Also, Revue Universelle des Mines, vol. 10, p. 552.

sible to compare them with the figures of practical lumbermen, it has been found that the tendency is to underestimate the damage. The two latest States to be examined are Oregon and Washington. The former is estimated to contain 234,653,000,000 feet, B. M., in standing timber, the latter 114,778,000,000 feet. Destruction by fire has been serious in Washington. On the assumption that the burned areas contained on an average as much timber as the untouched portion, 40,000,000,000 feet have been destroyed since lumbering began. This amount would supply all the sawmills of the United States for two years, and, at a value of only 75 cents per M., means a dead loss to the State of $30,000,000. The amount actually logged in the same period has been 36,000,000,000 feet, making the estimate by the same comparison of areas. Oregon has suffered less from both fire and lumbering, owing to the smaller facilities for marketing the product.

Wet Crushing and Cyaniding the Siliceous Ores of the Black Hills, South Dakota.

Written for the MINING AND SCIENTIFIC PRESS by JOHN M. HENTON.

In the spring of 1899 the Dakota Mining & Milling Co., under the management of Capt. Seth Bullock, owning the Gunnison group of mines and other claims in the Portland district, west of Deadwood about eight miles, after investigating the merits of the process, decided to try wet crushing and cyaniding of these ores.

In July, 1899, the company commenced to repair a stamp mill in Central City, S. D., near Deadwood, and to build a cyanide addition to it. The mill started up on October 14th, 1899, and from the first the extraction was all that had been expected, and the saving, as far as could be judged from the workings of the new plant, was equally good.

But the wet crushing of these siliceous ores was new and many adjustments had to be made to meet the many difficulties which arose, and it was the first year before any steady, continuous work was done of sufficient duration and amount of ore treated from which a definite determination of the saving could be made. These adjustments and changes were completed by January 8th, and 224 tons of ore milled immediately following that date gave a saving in precipitates, cleaned up and shipped to the refinery, of 80% of the assay value of the ore. There is nothing very remarkable about this only as it shows the success of the method as applied to these ores.

The ore is wet crushed in the ordinary stamp mill battery in the cyanide stock solution. No attempt is made to amalgamate, as the ore contains no free gold. A 6-mesh woven wire screen and low discharge are used. The resulting pulp is of the following fineness: 18% remains on a 20-mesh screen; 12.6% remains on a 40-mesh screen; 5.2% remains on a 60-mesh screen; 7.4% remains on an 80-mesh screen; 7.4% remains on a 100-mesh screen; 49.4% is finer than 100-mesh.

From the battery the pulp is run into a tank 16 feet in diameter and 7-foot staves by means of a centrifugal pump, the floor of the vat being on a level with the battery. The excess of solution is drawn off to the sump by means of floats and is returned to the storage tank, to be again used in the battery, in this way making the use of the solution continuous and but a small stock necessary.

This tank into which the pulp is run from the battery is provided with an agitator appliance of the pattern described by Matt W. Alderson, page 612, MINING AND SCIENTIFIC PRESS, June, 1899, and from plans and specifications thus furnished by him.

When a sufficient charge has accumulated the batteries are hung up and the agitator is started. When the charge is all under the action of the agitator, sufficient cyanide is added to bring the solution up to that strength which has been found best to secure the extraction. This is not always the same and no fixed rule has been followed. At times an extraction of 55% to 75% has been secured in the battery with the stock solution before the treatment proper had begun. Then, again, this battery extraction has been less than 25% of the assay value. The time of agitation is not always the same, but will average about three hours. Stock solution is then run into the agitator and at the same time decanted off, the agitation being continued and the rate of decanting being a little greater than the rate of filling. In this way the slimes are washed out of the sands and into a tank large enough to hold a few days' run and from which the solutions are drawn by siphon. The sands are then run into a percolation vat, where subsequent treatment is by that method.

Zinc shavings are used for precipitation and the solutions are run direct into the zinc box without an intermediate gold solution tank. In drawing from the slimes tank a siphon hose of just the size to equal the working capacity of the zinc box is used. But one zinc box is used and all the gold solutions of whatever degree of strength and richness in gold, and a considerable part of the wash water, are run through this one box. In size it is 13 feet long, 2 feet deep and 2½ feet wide. The zinc capacity of each compartment is 30 inches long, 18 inches deep and 15 inches wide. But four of these compartments are in use. More were used at first, but it was often found that there was no precipitation below the third after solutions had been running through the box for a week, and all below the fourth were discontinued.

The following table will show the conditions of the solutions and the precipitation during the month of January, 1900. The items are continuous and not selected and the values were determined from the assay of ten A. T. quantities made by evaporation.

Value of solution entering zinc box.	Value of solution leaving zinc box.	KCN in pounds per ton.	Alkalinity in % in terms of H2 S O4.
$3 30	None.	1.1	.3
2 80	None.	1.7	.55
3 10	$ 40	2.0	.5
2 80	30	1.3	.45
2 80	15	1.8	.7
2 70	05	2.0	.6
2 70	Trace.	1.9	.45
3 00	15	2.0	.5
3 20	35	2.4	.85
2 40	20	2.4	.75
2 60	05	2.3	.65
4 10	15	2.4	.5
3 20	1 70	2.9	1.00
3 80	15	2.1	.4
3 90	10	2.0	.7
4 80	50	2.2	.55
4 20	40	1.5	.4
4 00	50	2.5	.5
3 50	15	2.2	.4
4 60	30	1.4	.25
4 00	20	2.1	.3

It will be noticed that the one case of bad precipitation is so very bad that it is probably a case of "salt." The rate of the flow of solution was an average of a little more than one ton per hour. It has not been found necessary under ordinary conditions to prepare the zinc box oftener than once a week.

Under the conditions of running the solutions without an intermediate gold solution tank an inflow of ore slimes is certain to occasionally happen through accident and carelessness, and then immediate attention to the zinc box is imperative.

The practise as here set forth is not original, but has been borrowed largely from that of Matt W. Alderson, also from the practise of Charles Butters in South Africa, as given in the MINING AND SCIENTIFIC PRESS, April 16, 1898. The details are given as showing what is being done by wet crushing and cyaniding these ores, and also as showing that by perfecting the work along these lines great success is attainable and practicable. It is not claimed that any of the details of work done represent the best practise, but only that the results obtained were secured in the way stated.

Treating Amalgam and Retorting.

The following is the process for extracting the gold from the mercury amalgam in the Colorado placer mines:

The amalgam as collected, whether from the sluices when working solely alluvial deposits or from plates and riffles when dealing with larger propositions, is carried onto a table slightly inclined with a grooved surface near the lower end, and a hole at the lowest point opening into a receptacle for catching any mercury that may escape. On this table is an iron kettle large enough to hold all the amalgam collected in a single cleanup. Into the collected amalgam and mercury some sodium amalgam—one ounce to each flask of mercury—is introduced, and the whole is stirred. After some time water is poured into the kettle above the mercury and stirred. Sand and mud rise to the surface and are removed with a large sponge. Washing and stirring continue until the surface is comparatively clean. The mercury is then made as dry as possible with the sponge and the whole stirred again with the hands. Some dirt generally rises, which is scraped off with a dry card or piece of leather drawn gently edgewise over the surface. This is repeated till the mercury seems clean.

It is then poured into conical bags of canvas or chamois leather, through the pores of which the mercury runs, or is squeezed, leaving the gold amalgam in the bag. A certain quantity of gold is retained by the mercury, which can only be recovered by retorting, but it is not desirable to do this if the mercury is to be used for further amalgamation, as the presence of gold increases its activity. The retort is a deep cast iron vessel shaped like a bowl; on top is a jointed iron from which an iron tube rises and bends downward. A mixture of wood ashes and clay is prepared. The balls of amalgam are placed in the bowl and the ashes put thickly around the edge. The cover is fitted and clamp adjusted. The retort is placed in a furnace over a moderate fire. The end of the pipe dips just below the surface of water placed in a vessel. When the retort has attained a dull red heat and no more mercury distills over, the retort is allowed to cool. The cover is taken off and the bullion removed. The amalgam after retorting has a gold metallic color. It is ready for the melting pot as soon as taken out. Gold from a placer is usually deposited in the local bank and thence goes to the mint for refining.

The sodium amalgam must be freshly made to be effective. If kept long it oxidizes. Metallic sodium may be kept in wide-mouthed bottles covered with coal oil. Enough for a single cleanup can be made in a small frying pan. A small quantity of mercury from a fresh flask is poured into the pan and dried with a sponge and then heated beyond the boiling point, but not enough to volatilize the mercury. A piece of sodium is cut into ½-inch cubes and the mercury taken out in the open air. A cube of sodium is placed with tongs in the center of the warm mercury. A flash follows; a small portion of mercury is volatilized and another cube of sodium is placed with less flash. This is repeated three or four times, when the sodium sinks down gently. At the proper moment a solid mass of amalgam will appear in the center. The contents of the pan are then stirred, and a few more added cubes change the whole to a mass of crystallized sodium amalgam.

Masonry Dams and Retaining Walls.

NUMBER IV.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE T. PARDOE.

We have now got the theoretical profile of our dam in the rough, as shown by the drawing, and in which the lines of resistance for the dam full and empty are shown by full lines and the boundary lines of the middle third through each joint are shown by dotted lines.

It will be noticed that from joint VIII downwards the line of resistance passes outside the "middle third" when the dam is empty, and that when the dam is full the line of resistance is slightly outside the boundary at joint V, but by so small an amount that it may be neglected unless the work is very important and provided that the masonry is of first-class character. It is, however, desirable to thicken joint V to the outside and from joint VIII downwards on the inside.

NOTE.—The lines of resistance, etc., are shown for the calculated profile.

The profile, as adopted for the construction, may be taken as shown by the dotted lines.

We have now to calculate what the maximum pressure will be on the foundations, taking the calculated profile.

The maximum pressure per square foot on a plane parallel to the foundation is given by the formula.

$$F = \frac{6\,W\,l}{L^2} + \frac{W}{L}$$ where F = maximum pressure,

W = total weight of masonry,

l = distance from center of joint to center of resistance.

L = length of joint.

Substituting figures for the above and for the whole dam, we have for reservoir full:

$$F = \frac{6 \times 4.6 \times 149735 \text{ lbs.}}{33^2} + \frac{149735}{33} = 4537 + 3795 =$$

8332 lbs. per square foot on outer face.

And 4537 − 3795 = 742 lbs. per square foot on inner face.

For reservoir empty we have:

$$F = \frac{6 \times 149735 \text{ lbs.} \times 5.6}{33^2} + \frac{149735}{33} = 9147 \text{ lbs. per}$$

square foot on inner face.

And 4610 − 4537 = 73 lbs. on outer face which is in tension.

It must be distinctly understood that this formula is based on the supposition that the material of which the dam is constructed is of uniform elasticity over its whole cross-section. This is not always strictly correct but is probably near enough for practical purposes and no serious trouble has hitherto been caused by neglecting any possible error on this count.

Having found the pressures at the faces, we may draw two sloping lines connecting perpendiculars erected at the ends of the base, the height of these perpendiculars being (to any convenient scale) proportionate to the pressures at the faces. The height of these sloping lines above the joint for which they are drawn represents by the same scale the pressure at any point on the joint. (See drawing.) By this means we can determine any convenient limit of stress for each joint within which limits we can use a cheaper class of material, such as concrete, which plan is sometimes advisable, but in the case of such a small job as this any possible saving is so small as not to be worth the risk of unequal settlement or other troubles.

The principle on which we have hitherto based our design is the law of the trapezium and its consequences, first proposed by Deloncle, and on which the design of many large dams have been based.

A modification has, however, been proposed by M. Bouvier, Ingenieur des Ponts & Chaussees, and although not correct it may be used with advantage provided that the angle which the resultant makes with the base is not very great.

Put into simple form, M. Bouvier appears to believe that it is not correct to consider the streams produced on a horizontal plane but that they should

be considered with reference to a plane normal to the resultant, which means, of course, if we consider the case of reservoir full, the C. of resistance is moved further towards the outer face with respect to both the middle third and the center of the supposititious joint.

To complete our calculations for our dam we will briefly consider the stress on the outer face by M. Bouvier's system.

Draw a sloping bed from the outer face at joint X normal to the resultant, and which bed will therefore be at about 50° to angle below the horizontal.

From the inner end of joint X drop a perpendicular onto this sloping bed, and the point where the perpendicular cuts it is the inner end. The length outside this is not allowable in the calculation.

On this line set out the limits of the middle third, and by means of the formula previously given (in which "W" will now be the value of the resultant instead of weight of masonry) we can calculate the maximum stress on the outside of dam when full.

In such a small dam as the one under consideration the maximum pressures at the faces should be in any case so small with respect to the safe limit of the materials that there is no necessity for the refinement of calculation and large increase of labor caused by adopting this theory as absolutely correct, and it is also not generally accepted and may be considered more as a scientific means of varying the factor of safety with varying angles of the resultant.

If we draw the lines to represent the inclined base, the water thrust, the weight of masonry and the resultant of forces for the whole dam, we have the following approximate quantities:

Length of base = 28.5 feet.

Distance between resultant and half width of base = 3.6 feet.

Resultant = 179000 lbs.

Intensity of pressure at outer face due to bending action $= \frac{3.6 \times 179000 \times 6}{28.5^3} = 4565$ lbs.

Mean intensity of pressure $= \frac{179000}{28.5} = 6070$ lbs.

Therefore the maximum stress along a line parallel to the resultant and at the outer face = 10635 lbs.

Now the pressure thus calculated may be split up into two forces, one horizontal and the other vertical and parallel to the vertical pressure calculated by the formula based on the simple theory previously explained.

Obviously, the vertical component bears the same relation to the resultant, as the cosine bears to the radius of the angle of deviation of the resultant. This angle is approximately 90°—2° and cosine = 0.96, and therefore 10635 × 0.86 = 9146 pounds = resultants.

M. Bouvier's idea appears to be that it is only correct to take the forces as acting on a place normal to the resultant.

This is, however, obviously not strictly correct, since the dam is—or should be—being built of rubble masonry and consequently there is not strictly any such action as described by him under the term "equivalent normal reaction."

TO BE CONTINUED.

In the Massachusetts Institute of Technology, in the course of electrical engineering, a student has chosen for his subject a study of the size of wire necessary when aluminum is used for a conductor of electricity, the relative capacity of aluminum as compared with that of copper. As the price of copper has risen so much and as the price of aluminum has fallen, the use of the latter metal has already begun to compete with that of copper in electrical manufactures. Insurance people have appointed a committee to follow the results of such tests and to make tables from them, as it is most important to know, when buildings are wired, the safe limit of the amount of current which any wire, covered or uncovered, may be made to carry. The method chosen for determining the relative capacity of the aluminum is one in which the temperature of the wire will be measured directly while it is carrying different amounts of electricity.

Details of Cost of War Eagle Mine Operations.

General Manager Kirby of the War Eagle mine, Rossland, B. C., furnishes detailed tabulation of the amount of work done, the cost of production and the smelter returns, all of which is of practical value and is condensed in the following:

The figures given show in detail: (a) The product of the mine for year ending September 30th, '99, as well as for October, November and December of last year: (b) Table showing width of stopes and percentages of pay area in main ore shoot December 31st, '99: (c) Table showing production and grade of ore from each level up to December 31st, '99, from main ore shoot only: (d) Comparative statement of work done and its cost per foot or ton from January 20th, '97, to December 31st, '99: (e) Table of mine costs for twelve months ending September 30th, '99.

values for three months—October, November and December of '99:

Tonnage	22,693
Smelter's gross assay value	$401,873 55
Smelter's net value	265,711 50
Smelter's gross value per ton	17 71
Smelter's net value per ton	11 71

TABLE SHOWING WIDTH OF STOPES AND PERCENTAGES OF PAY AREA IN MAIN ORE SHOOT DECEMBER 31ST, '99.

Portion of Ore Shoot.	Area of Stopes, Square Feet.	Stoped Area in Percentage of Shoot Area.	Average Width of Stopes, Feet.
Block above level No. 1	37,850	78	5.2
Block above level No. 2	45,000	66	8.1
Block above level No. 3	38,480	56	8.3
Block above level No. 4	17,500	42	8.9
Block above level No. 5	12,270	37	13.2
Block above level No. 6	9,280	19	10.0

NOTE.—On levels 5 and 6 the stopes are still being extended. The first four levels are about worked out, so the percentages given show the total pay area. The stoped area in percentage of shoot area is an approximation.

TABLE OF MINE COSTS FOR TWELVE MONTHS ENDING SEPTEMBER 30TH, '99.

	Development Work. Cost Per Foot		Ore Extraction. Cost Per Ton		
	Sinking Main Shaft.	Sinking Small Winzes.	Raising.	Drifting.	Stoping.
Total number of feet	122½	7	417	1884½	.....
Tons of ore stoped	.....	.....	.....	.....	45,810
Drilling	$ 52 55	$21 00	$14 01	$ 8 45	$1 53
Tramming and shoveling	4 22	5 00	4 06	3 10	53
Timbering	23 22	4 86	3 16	07	29
Hoisting	9 72	1 10	15	20	13
Smithing	5 18	2 11	1 88	1 21	15
Ore sorting	74	.....	14	.....	01
General labor	10 04	3 10	3 36	2 39	30
Air	7 32	2 44	2 76	1 55	21
Candles and illuminating oil	95	54	40	27	03
Lubricating oils and waste	75	19	22	14	02
Explosives	5 25	3 49	3 22	1 87	25
Drills and fittings	1 71	83	52	26	05
Mine supplies	1 61	46	49	35	04
Lumber expense	74	38	45	32	03
Stable and teaming	1 19	45	42	28	04
Assaying	54	80	40	19	05
Surveying	90	09	28	18	02
Electric lighting	74	.....	40	28	03
Salaries	4 07	2 35	1 76	1 21	18
Office expense	38	42	14	08	01
General expense	1 10	38	56	38	05
Totals	$122 92	$49 99	$38 78	$22 78	$3 95

Ore stoped, 45,810 tons: met in development, 1,671 tons: from dumps, 3,762 tons; total, 51,243 tons.

COMPARATIVE STATEMENT OF WORK DONE AND ITS COST PER FOOT OR TON TO DECEMBER 31ST., '99.

	Jan. 20, '97, to Sept. 30, '97.			Oct. 1, '97, to Sept. 30, '98.			Oct. 1, '98, to Sept. 30, '99.			Oct. 1, '99, to Dec. 31, '99.		
Development Work.	Work Done, Feet or Tons.	Total Cost.	Cost Per Foot or Ton.	Work Done, Feet or Tons.	Total Cost.	Cost Per Foot or Ton.	Work Done, Feet or Tons.	Total Cost.	Cost Per Foot or Ton.	Work Done, Feet or Tons.	Total Cost.	Cost Per Foot or Ton.
General work, stations, retimbering, etc	.....	$ 3,770 15	.....	.....	$ 18,249 34	.....	.....	$ 11,830 26	.....	.....	$ 1,897 27	.....
Drifting, Feet.	1,803	46,313 33	$20 11	3,480	74,958 25	$21 54	1,884	42,927 28	$22 78	837	21,850 64	$26 10
Raising, Feet.	421	12,766 98	30 33	451	13,726 95	30 43	417	16,169 89	38 77	253	8,495 12	33 51
Sinking—Small shafts or winzes, Feet.	.....	.....	.....	.....	.....	.....	7	349 95	49 99	42	1,826 93	43 50
Sinking—Main shaft, Feet.	175	16,150 31	92 29	185	17,508 99	96 26	122	16,283 05	132 92	70	6,897 51	98 54
Total development work, Feet.	2,899	$ 79,002 75	.....	4,116	$124,743 53	.....	2,430	$ 87,560 43	.....	1,202	$ 40,967 47	.....
Ore Extraction.												
Ore from development work, Tons.	2,596	.....	.....	2,316	.....	.....	1,670	.....	.....	1,894	.....	.....
Ore from dumps, storage, etc, Tons.	.....	.....	.....	.....	.....	.....	3,763	$ 2,252 26	$ 0 60	721	$ 563 29	$ 0 78
Ore stoped, Tons.	4,810	$ 15,034 94	$ 3 24	26,559	$ 86,070 10	$ 3 24	46,810	181,224 01	3 95	20,079	77,074 18	3 84
Total ore sold, Tons.	7,406	$ 15,034 94	2 11	28,875	$ 86,070 10	2 98	51,243	$183,476 27	3 58	22,694	$ 77,637 47	3 42
Summary.												
Cost of development, per ton of ore sold, 7,406		$ 79,002 75	$10 67	28,875	$124,743 53	$ 4 32	51,243	$ 87,560 43	$ 1 71	22,694	$ 40,967 47	$ 1 80
Cost of ore extraction, per ton of ore sold, 7,406		15,034 94	2 11	28,875	86,070 10	2 98	51,243	183,476 27	3 58	22,694	77,637 47	3 42
Total cost of mining, per ton of ore sold, 7,406		94,037 69	12 78	28,875	210,813 63	7 30	51,243	217,036 70	6 29	22,694	118,604 94	5 22

TABLE SHOWING PRODUCTION AND GRADE OF ORE FROM EACH LEVEL UP TO DECEMBER 31ST, '99.

FROM MAIN ORE SHOOT ONLY.

Portion of Ore Shoot.	Net Tonnage Produced. Tons.	Smelter's Gross Assay Value, Per Ton.
Block above level No. 1	19,601	$24 52
Block above level No. 2	30,299	20 09
Block above level No. 3	31,432	16 67
Block above level No. 4	15,006	14 12
Block above level No. 5	15,004	15 68
Block above level No. 6	5,279	17 19
Totals	122,681	$20 48

PRODUCT OF THE MINE FOR YEAR ENDING SEPTEMBER 30TH, '99.

Tonnage	51,243
Smelter's gross assay value	$824,852 92
Smelter's net value	505,562 03
Smelter's gross value per ton	16 28
Smelter's net value per ton	9 92

To this may be added figures showing product and values for three months—October, November and December of '99:

Tonnage	22,693
Smelter's gross assay value	$401,873 55
Smelter's net value	265,711 50
Smelter's gross value per ton	17 71
Smelter's net value per ton	11 71

Notes on Mill Work and Results Thereof.

Written for the MINING AND SCIENTIFIC PRESS by E. L. BALLOU.

The results of mill work here given were obtained the past season at the Garnet G. M. Co.'s 20-stamp mill near Pony, Montana. The ore worked was a tough quartz with vein matter, the whole carrying 4% of partly oxidized sulphides of iron, lead and copper. The gold was very fine and alloyed with silver, making the bullion worth $13.50 per ounce.

The ore passed through breaker, self-feeders, under 950-pound stamps and through thirty-mesh steel wire cloth. The pulp then passed over lip, apron and sluice plates, and plates were also used on the vanner spreading boards. The pulp was sized before passing to the two 4-foot corrugated and four 6-foot plain belt vanners. No quicksilver was used in the mortars, but was sprinkled on the lip and apron plates, as required. The free gold varied from $1 to $6 per ton of ore, and a better saving was had on the richer ore.

The apron plates were dressed every six hours, the

amalgam being removed as often as its condition and the quantity warranted—usually once a day. A full clean-up was had the first of each month and a partial one on the 15th. Battery samples were taken every six hours and tailings outside the mill every three hours throughout the season. The accumulated samples were dried and assayed once a week, or oftener if necessary.

In 166½ working days 7645 tons of ore passed through the mill. From the plates 447 pounds of amalgam were obtained in thirteen clean-ups. No gold was obtained from the mortars. The amalgam was ground with an excess of quicksilver and squeezed in hot water. The retorted gold still carried sufficient sulphides to form a troublesome matte when melted. This was got rid of by removing the crucible from the fire as soon as its contents were melted, watched until the gold chilled, when the still liquid slag and matte were poured off. When again melted, a little niter was added and the gold poured. This was found the quickest and cheapest way to get clean bars.

The free gold was 62% of the value obtained, the balance being in the 308 tons of concentrates.

The loss of quicksilver from all sources for the season was 37½ pounds, or a trifle less than five pounds per 1000 tons of ore crushed. Formerly, when using quicksilver in the mortars, the loss was six times as much, the saving of free gold being rather less than with outside amalgamation.

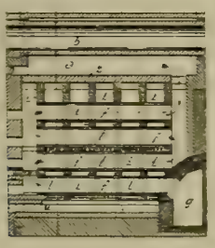
The mill saved 82.2% of the assay value of the season's run of ore, the loss of silver being more than that of gold.

Latest Mining and Metallurgical Patents.

Patents Issued Feb. 27, 1900.

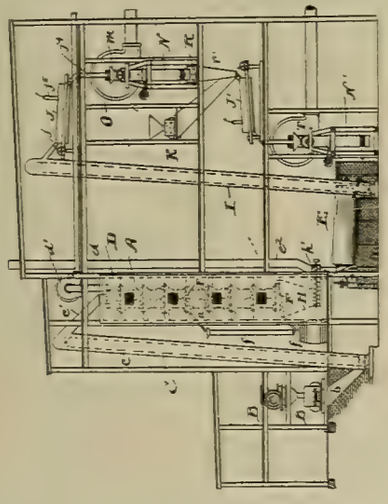
Specially Reported for the MINING AND SCIENTIFIC PRESS.

METALLURGICAL FURNACE.—No. 644,162: J. A. Drake, Ovenden, England.



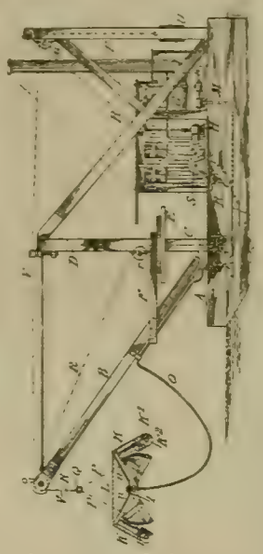
In a regenerative furnace, combination, with an outer casing, and series of longitudinal heating flues F arranged therein one above the other, forming a tortuous passage for the products of combustion; of a series of transverse imperforate walls I supporting flues and forming a series of cold-air passages having no communication with each other, tiles arranged in passages so that cold air is conducted around each heating flue, and a series of longitudinal air-inlet passages U arranged under flues F, each cold-air passage being provided with a separate inlet passage so that the air passing through each can be regulated separately to secure uniformity of temperature.

APPARATUS FOR SEPARATING METAL FROM ROCK.—No. 644,181: C. H. Lane, Cleveland, Ohio.



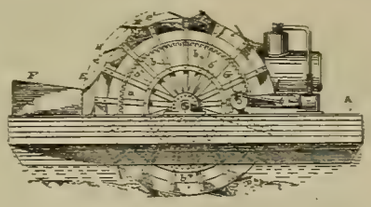
In an apparatus for separating metal from rock, the combination of a series of crushing rolls adapted to act successively upon the material to reduce it to a pulverized condition, a drier, a beater device, an inclined air separator tube, and mechanism for conveying the material from one and delivering it to another of the devices in the order stated, with an outlet pipe connected in the upper end of air separator tube, a settling chamber connected in pipe, a suction fan for creating an air current up through air separator tube and through its outlet pipe, and settling chamber, a discharge pipe connected in lower end of settling chamber, a screw conveyer therein, a spring-actuated valve for closing the outlet of discharge pipe, a crushing device into which pipe discharges, a beater device into which crushing device delivers its product, an inclined air separator tube, means for slowly delivering material from beater into tube, an outlet pipe connected with end of air separator tube, a settling chamber connected in outlet pipe, and a suction fan connected with pipe beyond the settling chamber.

DREDGER.—No. 644,457; W. B. Pless, San Francisco Cal.



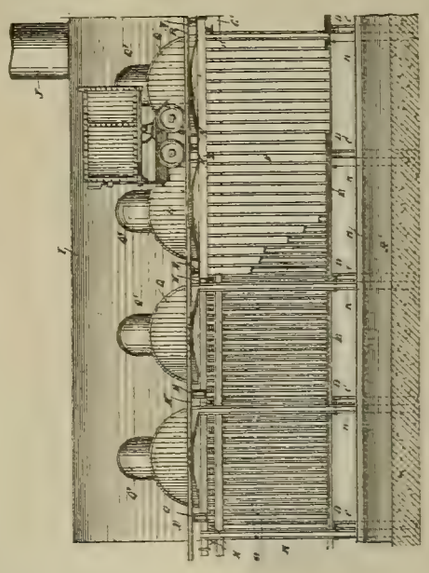
A dredge bucket composed of two sections pivoted together by means of bails or yokes, a cylinder and piston secured to each yoke, a guide on each piston, guides on yokes, a chain or cable connecting the two cylinders and passing over guides and fluid pressure connections to both cylinders, whereby the outward movement of piston causes the bucket sections to close.

ROTARY DREDGING AND EXCAVATING MACHINE.—No. 644,521; D. Jordan, San Francisco, Cal.



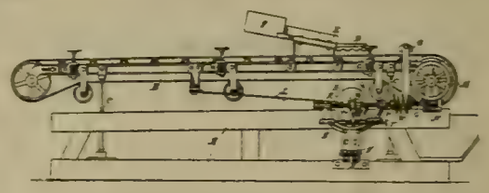
In a dredging machine, combination of scow having well or opening, dredging wheel mounted to rotate in opening in contact with submerged bottom to be dredged, alternately disposed cutting and excavating devices and water elevating devices on periphery of wheel, slanting aprons connecting back of one device with bottom of device next in front, and receptacle on scow adapted to receive material and water from the discharge side of the wheel.

FURNACE FOR DESULPHURIZING ORES.—No. 644,424: H. Guyer, Casapalca, Peru.



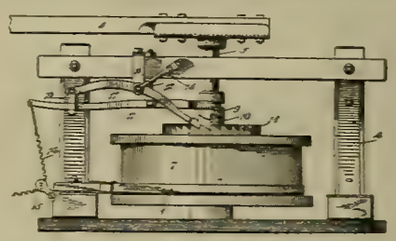
An ore desulphurizing furnace, comprising a series of posts, cross-ties therein, firebox set on cross-ties provided with channel iron bottom resting on cross-ties, grate bars set in channel iron bottom extending upwardly and outwardly, longitudinal binding bars for upper ends of grate bars, transverse anchor rails for binding bars and grate bars, binder posts outside of grate bars and connected with the anchor rails, longitudinal bars for binder posts, and transverse holding beams having curved ends for engagement with longitudinal binder post bars.

CONCENTRATOR.—No. 644,289; G. Gates, Jackson, Cal.



In a concentrator, a combination with belt and feeding devices, of a trough interposed between same and constructed with connected channels from which pulp successively overflows from one channel to the other, channels provided with bottom discharges whereby pulp is delivered directly upon belt, at different points in length thereof, depending on its gravity, the feeding devices connecting with initial channel of series. An endless traveling belt concentrator, combination with moving belt of series of troughs extending transversely above belt having edges connected to form continuous overflow from one to another, spaced perforations made in bottoms of troughs from end to end, perforations alined transversely of troughs and in line lengthwise of belt, and a preliminary distributer consisting of divergent troughs by which pulp is delivered from a common supply into first trough simultaneously from one end to the other; mechanism for distributing and grading pulp and afterward depositing it upon endless traveling belt for concentration.

HOIST.—No. 644,468: R. Rutter, South Butte, Mont.



Hoisting apparatus, combination with frame or support, of drum mounted to turn thereon, clutch serving to transmit movement to drum, a lever mounted on frame or support and having connection with clutch to actuate same, ratchet attached to drum, and pawl working with ratchet to prevent back movement of drum when the clutch is in gear, such pawl having connection with clutch lever so as to disengage pawl from ratchet simultaneously with disengagement of clutch.

Cost of Coal Output.

Now, when coal is both scarce and dear, and a likelihood that it will become still dearer, it is of interest to know how the leading coal-producing countries compare in reference to the cost of their fuel and the efficiency of their workers as illustrated by the average output of coal per employe. Following are returns from the official statistics of the countries enumerated of the average value at mine of the coal production of the different countries, with the average annual output per employe:

	Average value. s.	d.	Average annual output per worker. Tons.
Great Britain	6	6	297
Russia	6	9	176
Sweden	7	11½	138
Germany	7	4½	271
Belgium	8	3½	179
France	8	8½	216
Spain	6	1	112
Austria	6	1½	181
United States	4	7½	450
Transvaal	1	8	224
British India	3	8½	68
New South Wales	5	1	455
Victoria	9	2	264
Tasmania	8	0	320
New Zealand	10	0	440
Cape of Good Hope	14	3	56
Natal	10	0	156

British India presents the conjunction of the cheapest coal and the lowest average output per worker, attributable to the low wages paid in that country. The dearest coal produced on a large scale is that of France; the United States, owing to the large average output per worker, shows, next to India, the lowest cost.

Proper Testing of Gold Dredging Ground.

Written for the MINING AND SCIENTIFIC PRESS by R. M. DOWNIE.

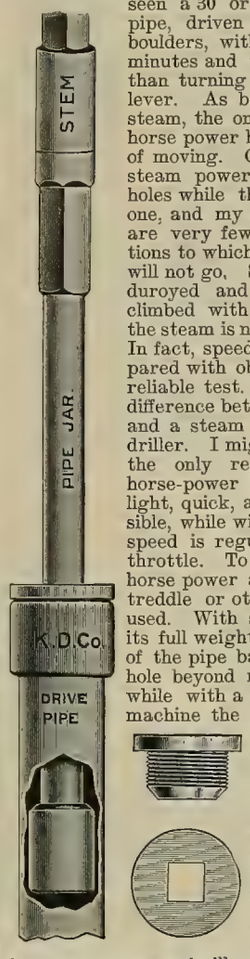
I notice in your issue of Jan. 27th an article on "Dredging for Gold," in which is illustrated and described a method of testing dredging ground by means of a light horse-power drill. Some of the suggestions in the article are good, but others are misleading. I will endeavor to correct some points as they occur to me and to suggest others.

First—A machine weighing less than 1000 pounds, "all told," is a mere toy and wholly inadequate. The article suggests a drill bar 12 to 15 feet long, 3 or 4 inches in diameter. Such a bar is about right, but it alone will weigh 500 to 600 pounds. Add a rope socket, say 50 pounds, jars 250 pounds, and say two bits at 150 pounds each, and we have about 1200 pounds in the necessary drilling tools alone, without allowing anything for machinery, sand pumps, driving head, horse-power, pipe pulling attachments, etc.

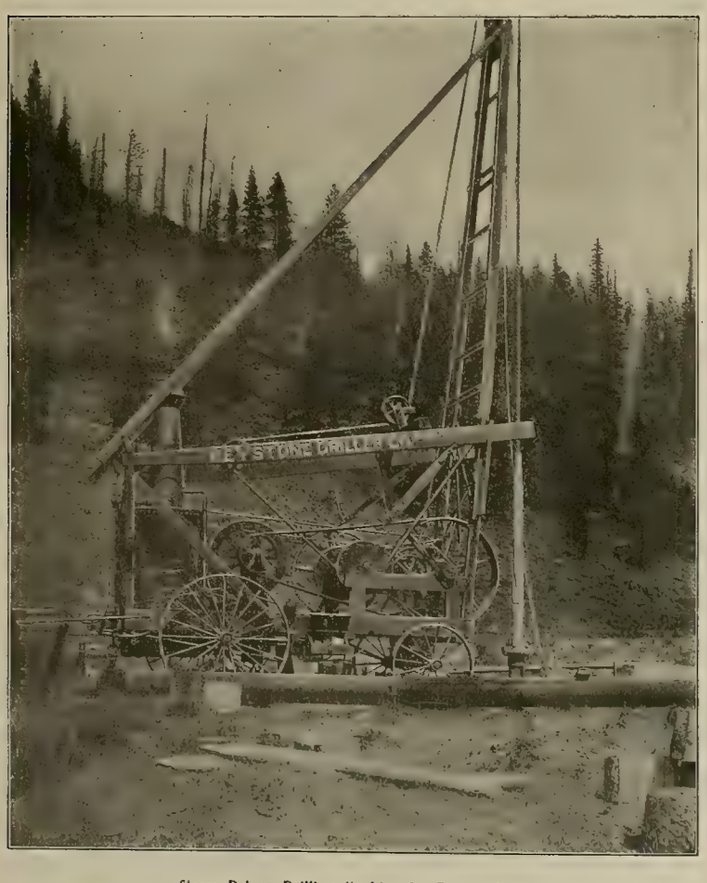
Second—The article suggests a sand pump 3½ feet long. Such a tool is inadequate and no one tool of this kind can be made which will suit all requirements. It is true that such a sand pump is about all a 1 H. P. machine will handle correctly, but to do good work and clean the hole effectively the pump should be of the style known as the vacuum pump. Such a pump will, in sand or small gravel, load itself full out of the bottom of the well and bring with it everything. We must remember that gold does not, of its own volition, rise into the stirred-up gravel and sand. A light sand pump will serve to gradually extract the mud and slush, but what is wanted is a tool which will, by suction, sink itself into the undisturbed formation and bring up everything within the area of the pipe. To load such a pump and start it from its bed in the sand often requires a pull of 2000 to 3000 pounds, and the force must be applied rapidly to get the best results. Neither one horse nor two nor three will do this. Many a good proposition has been condemned by using an inadequate sand pump, leaving the gold in the bottom of the hole, to be driven off by the drilling tool into the sides of the wall and lost.

Third—The article further suggests greasing the outside of the pipe to be driven. This I consider a mistake. There should be no grease or oil whatever used in setting up the pipe or on the outside of it. If grease is used about the pipe it will inevitably become mixed with the drillings and make it impossible to pan the gold accurately. The grease on the outside of the pipe is wholly useless for the purpose intimated (to make the pipe easily withdrawn), and if used will prevent an accurate test being made. If anything is used to lubricate the joints of the drive, plumbago, moistened with linseed oil, should be used, and that sparingly.

To withdraw the pipe, the process of driving it should simply be reversed, using pipe jar, as shown in the illustration.



With such a tool and a properly constructed machine lifting jacks are not always needed. I have seen a 30 or 40 foot string of 6-inch pipe, driven solidly into gravel and boulders, withdrawn in less than five minutes and without other hand labor than turning a throttle and pressing a lever. As between horse power and steam, the only possible advantage the horse power has is in the one matter of moving. Once on the ground, the steam power will make three or four holes while the horse power is making one, and my experience is that there are very few possible dredging locations to which a good traction engine will not go. Swamp roads can be corduroyed and a 20% grade can be climbed with them. The advantage of the steam is not altogether in the speed. In fact, speed is a small matter compared with obtaining an accurate and reliable test. To fully understand the difference between a horse-power drill and a steam machine, one must be a driller. I might say, however, that as the only regulator of speed on a horse-power drill is the horsewhip, a light, quick, accurate stroke is impossible, while with the steam machine the speed is regulated to a nicety by the throttle. To make it possible to use horse power a machine with cam and treddle or other stop motion must be used. With such motion the drill falls its full weight and packs the contents of the pipe back into the walls of the hole beyond reach of the sand pump, while with a properly arranged steam machine the drilling is done on what drillers call "the spring of the line." This enables the operator to make sixty to seventy light "touch-and-come" strokes per minute as against twenty to twenty-five dead "punch-and-settle" strokes of the horse-power driven machine. The difference, in effects produced, between these two processes is illustrated in the fact that, if a hard boulder is struck with the slow-motion drill, it is liable to be driven off to one side to afterward help wedge the pipe, while with the light, quick, steam-driven drill, a boulder (even if only a corner of it projects into the area of the hole) is drawn into the well and cut up. That this is true will not be questioned by practical drillers who have worked both kinds of machines.



Steam Driven Drilling Machine for Prospecting.

The importance of this difference is manifest when it is remembered that what happens in the case of the boulder also takes place, in some degree, with reference to all the materials found in the area of the test hole. With the dead stroke of the horse-power machine, very much of the cuttings is driven off and packed into the walls of the well and is not brought to the surface at all. That this is true can be readily proven by measuring or weighing the materials excavated by the horse-power drill and comparing the volume taken up with solid contents of the area of the hole. On the other hand, the light, quick stroke of the steam-driven drill, of the proper construction, makes it possible to show at the surface a volume of material equal to that required to fill up the hole full to the top.

To make an accurate assay of the ground prospected, all the material within the area of the drive shoe must be produced at the surface and the gold extracted from it. If either more or less is taken up a correct estimate cannot be made.

The cut of the machine shown illustrates one kind which is used with success.

The above is written from the experience of one who has made the subject an experimental study for about thirty years.

Portable One-Stamp Mill.

The portable one-stamp mill herewith illustrated is designed to enable the miner to test ore by working it in an economical way, and thus determine whether it will be profitable to erect a large mill.

Fig. 1 is a general view of the mill. The mortar is preferably made circular in horizontal section, and is oval shaped in vertical section. It is 8 inches diameter inside; the shoe and die, made of chilled iron, are 4 inches diameter, there being room for feeding ore and for splash. The hole through the top of the mortar serves as the lower bearing for the stamp rod, which, with tappet and shoe, weighs forty-five pounds, and drops 6½ inches to 7 inches with a force of 750 pounds. The upper part of the mortar supports the two iron columns or pillar blocks for the cam shaft. One of these columns projects above the shaft, and the top of it serves as the upper bearing for the stamp rod. There is a screw at this place. By turning it the stamp rod is held fast while cleaning up the mill. The ore is fed through a large hole at the side of the mortar near the top. There is also a half-inch pipe and stop cock to supply the mortar with water. The discharge at the front is square, 6 inches by 6 inches, and the screen is fastened by wedges in the usual way. The mill is furnished with five sheet-iron slot punched screens and five assorted meshes.

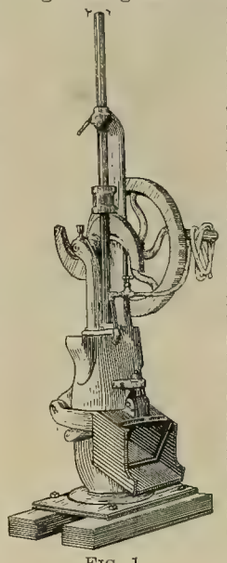


FIG. 1.
(Patent Applied for.)

The mortar is divided longitudinally into two parts, the upper part being fastened to the lower by a hinge pin and one hinge bolt. When the nut of the latter is loosened, the upper part of the mortar with all its belongings can be turned over to rest upon the ground, as shown in Fig. 2. This arrangement

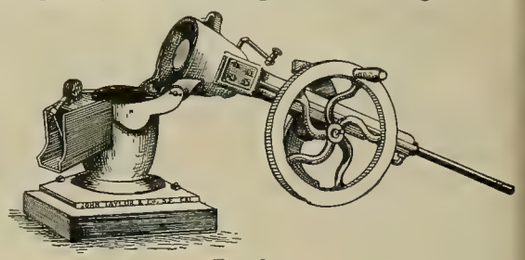


FIG. 2.
(Patent Applied for.)

is intended to give greater facility for rapid and effective cleaning up; by withdrawing the hinge pin the upper half can be entirely removed, thus rendering it portable. A rubber gasket placed between the two parts of the mortar prevents leakage, when the bolt on the front side of the mortar is tightened. The flywheel upon the cam shaft is 18 inches in diameter, and takes a 1½-inch belt. The mill can be operated by hand or power. It is made and sold by John Taylor & Co., 63 First St., San Francisco, Cal.

Pressure Lost in Transmitting Air Through Pipe.

Cubic Feet of Air Compressed to a Gauge Pressure of 80 Pounds and Passing Through the Pipe Each Minute.

Diam. of pipe in inches...	50	100	200	400	800	1000	1500	2000	3000	4000	5000
	Loss of Pressure in Pounds per Square Inch for Each 1000 Feet of Straight Pipe.										
1¼	3.61										
1½	1.45	5.8									
2	0.20	1.05	4.30								
2½	0.12	0.35	1.41	5.80							
3		0.14	0.57	2.28							
3½			0.26	1.05	4.16	6.4					
4			0.14	0.54	2.12	3.27	7.60				
5				0.18	0.68	1.08	2.43	4.32	9.6		
6					0.28	0.43	1.00	1.75	3.91	7.10	10.7
8					0.07	0.10	0.24	0.42	0.93	1.68	2.59
10							0.08	0.14	0.30	0.55	0.84
12									0.12	0.22	0.34
14										0.10	0.16

SECRETARY GAGE is trying to have Congress enact legislation placing the hydrographic office of the navy under the Coast and Geodetic Survey.

MINING SUMMARY.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—The Wildman-Mahoney properties in Sutter Creek since 1894 have been under joint management. There is a 40-stamp mill on each property, which is kept running upon ore from its own mine. Water power is delivered at the Wildman under a vertical fall of 525 feet. Besides a separate wheel for the hoist, air compressors, saws, etc., the water is pumped out of the mine by a Knight hydraulic pump. The mine water is caught in a tank at the surface and used in the batteries of the mill. The Wildman incline shaft is 1300 feet deep. A bucket is used in a single compartment, and it is no easy task to keep the 40-stamp mill supplied with ore under these conditions. Yet it is done, even while retimbering is being done in the shaft. The ground at the Wildman is constantly swelling, necessitating heavy and careful timbering. At the Mahoney the shaft is down 1000 feet, where it is connected with the 800 level of the Wildman, the latter being on the lower ground. The Mahoney is a large three-compartment shaft, in which 2½-ton skips and 450-gallon water tanks are used. The 9-foot water wheel is direct connected to the double-reel hoist. A large standing crane, with hydraulic connections, expedites the handling of timbers. The two properties have 165 employes, disbursing about $14,000 per month. The ore is 2% sulphurets, and these are shipped to Selby's. The Emerson vertical shaft, several hundred feet from the Wildman mill, will strike the vein at a depth of 2200 feet. It is contemplated to build a 100-stamp mill near the Emerson shaft. This will give the company an equipment with 180 stamps. The Wildman is a close corporation, the principal stockholders being Boston people. John Ross, Jr., is Supt.; David Ross, accountant; S. C. Thomas, foreman of mine; Jas. A. Little, chief machinist.

The Lincoln mine joins the Mahoney on the north. It is one of the old claims of the district, and yielded fully $4,000,000 before being abandoned years ago. Below the 600-foot level a rich ledge was broken off abruptly; there the early workers quit. For 350 feet from the surface they had extracted ore from a shoot 12 to 30 wide that paid $20 to $100 per ton in free gold. Another rich shoot was worked 160 feet through the Stanford shaft. It is the effort of the present company to rediscover this gold-bearing formation. They have opened up the old caved shaft and sunk 450 feet deeper. A crosscut below the old workings encouraged the company to continue sinking, and now another crosscut is being run at the lowest depth in the shaft. The mine has a large double reel steam hoist and air compressor. The change room is heated by exhaust steam. Water from the mine is hoisted in 500-gallon skips, and of these there are about ninety each twenty-four hours. Ex-Senator E. E. Voorheis is Supt. of the Lincoln and also joint owner of extensive reduction works at Sutter Creek. The mine employs twenty-five men.

Sinking goes on at the Mutual mine, joining the Lincoln on the north. The vertical shaft is down 350 feet. The 90 H. P. boiler is encased in a non-conducting preparation made of sawdust and lime. S. R. Porter, also of the Baliol, is Supt. About twenty men are employed.

The Keystone mine at Amador City is the largest enterprise on the northern portion of the Mother Lode. It has been in operation for nearly fifty years, and has produced many millions of dollars, four or five millions having been distributed in dividends. Supt. Prichard says that the mineral formation is here 300 to 400 feet wide, with heavily mineralized ledges of varying width coursing through it. At places several of these ledges come together, making a large ore body of great richness. The shaft is vertical, and is now 1200 feet deep. At the hoisting works, which are located on the hillside, 100 feet above the mill, there is a double-reel steam hoist. It does its liveliest work in hoisting water, which is brought up in 520-gallon tanks. Of these, 100 gallons are hoisted each night, at the rate of thirty-two per hour. Fitted to the hoist is an ingenious indicator to mark the position of the skip. The mill is run by water power under 285-foot pressure, and is equipped with forty stamps, two roller mills and eight concentrators. Twenty stamps can be run by a 34 H. P. gasoline engine. The present management of the Kennedy is in the hands of young men. Supt. W. A. Prichard is a graduate from the School of Mines of the University of California, and is probably the youngest superintendent in the State; C. E. Bunker is foreman; W. L. Cobb is metallurgist. About 100 men are employed. Below the Keystone mill is an extensive blanket plant run by Hottinger Bros. They pay the company one-fourth royalty.

At the Bunker Hill mine, north of Amador City, development work is done. This was an extensive mine, with one shaft 1000 feet deep, another 800 feet deep and a 20-stamp mill connected by wire tramway with the hoists. A new company, with C. R. Downs as Supt., has cleaned out and repaired the old workings. A new hoisting works will be put in. The old 800-foot shaft will be sunk 400 feet farther.

The Fremont Con. comprises four claims, three of which lie for 4200 feet along the Mother Lode—the Fremont, Gover and North Gover. The Loyal Lode is a parallel location with the last named. The company owns a section of land, part under agricultural patent. The Gover mine yielded $1,000,000 within three years with a 10-stamp mill. The shaft was 1500 feet deep. The reorganized company now conducting operations is sinking a double-compartment shaft 1500 feet north of the old Gover works; it is now down 167 feet Goodall, Perkins & Co. are controlling stockholders, C. E. Purrington is Supt. and Wales Palmer foreman. The present work began Jan. 2, 1900. Twenty men are employed.

The Centennial and Pocahontas are active properties near Drytown. The latter is superintended by Allen McWayne, principal merchant at Drytown. The formation is disturbed, and it is desired to attain depth, where it is thought an unbroken ledge will be found. At the Centennial, under the superintendence of L. A. Gross, there is a ledge along which in the foot wall gouge they have sunk 630 feet. There are crosscuts at various levels, the last, at 250 feet, showing a ledge 17 feet thick. It is proposed to go 1000 feet before crosscutting again. New machinery, consisting of steam hoist, pumps, blowers, etc., will be put in. The stockholders in this company are largely Boston people. Seventeen men are employed; Robert Reed foreman.

The New Western M. & R. Co. is prosecuting at Plymouth. It is proposed to work over the old ore dumps of the Empire and Pacific mines, two rich properties formerly operated by Alvinza Hayward. There are thousands of tons in these dumps, and, even with enlarged works, it will require several years to finish the undertaking. The present plant is to be doubled as to machinery equipment and an extensive blanket plant will be added. This work is now going on under the superintendency of T. C. Woodworth.

The Shenandoah is 1½ miles north of Rlymouth. The present shaft was started in May, 1899. It is 275 feet deep. A crosscut has been run back to the ledge. S. K. Thornton is Supt. Mr. Thornton has devised a self-dumping device for his buckets. Eleven men are employed.

At the Gowanus, near Plymouth, a vertical shaft is being sunk with machinery formerly on the Anita mine, near Jackson. It is expected to strike the ledge at a depth of 200 feet. There are four ledges on the property. The mine is owned by the High Point Co., composed mainly of Des Moines, Iowa, stockholders, who are also developing at this time the Manhattan and an adjoining claim at Stent, Tuolumne county. A. Rodger is Supt. at the Gowanus.

Plymouth, Feb. 24.

CALAVERAS COUNTY.

The Hannon property near Petersburg has been leased to a San Francisco company for twenty years for mining purposes. Twenty thousand dollars' worth of dredging machinery will be used.

Unwatering the Union copper mine at Copperopolis is completed. New machinery will be bought.

The Melones M. Co. at a special meeting in Boston on the 7th voted to issue 35,000 shares of $10 each in 12% preferred stock in addition to the present capital of $2,000,000; to convert 35,000 shares of common stock in the treasury into 12% preferred stock, the 70,000 preferred shares thus provided for to be sold to provide money.

EL DORADO COUNTY.

(Special Correspondence).—Since my last letter a fine body of ore, 5 feet wide, has been struck in the bottom of the Ribbon Rock shaft. The ore shows plenty of gold. This property is being operated by Hayward & Davis. I understand the old Eply mine just north of the Ribbon Rock will be opened again after being idle for many years. In former years this mine produced considerable ore milling over $20 per ton.

The Loupole mine, east of Placerville, recently purchased by some Indiana people, is being equipped and will be run upon a more extensive scale.

The lessees on the Poverty Point mine, the property belonging to the late John Melton estate, are running fifteen stamps constantly and are doing well.

The Blue Gouge mine has started up four Huntington mills upon their property, and if they succeed in saving the values, it will be worked upon a large scale, as the ore bodies are large.

The Gentle Annie group of mines, also controlled by the Melton estate, have been idle since his death, owing to some complications.

The Kimball & Kohn mill is running and employing about thirty men. The Chapman & Parker gravel mill is also running.

The Union mine (old Springfield) is doing well and a 10-stamp mill is now being put up on the adjoining property.

The information given in my last letter reporting a 7-foot vein in the old Vann mine was incorrect.

The old mine in Jayhawk district, formerly worked by Blakmore Bros., is now being worked by Pownstown & Hayward.

The Boulder mine and mill, controlled by the Willman Bros., is now under bond to a Scotch company. Allen Morrison is Supt. and the mill runs are satisfactory.

The Larkin mine has a fine body of ore on the 600-foot level. They are working about forty men.

Springer Bros. brought in last week several hundred dollars worth of as fine specimen gold as ever came into Placerville. It was taken from the ranch near Ringgold and last year they took out several thousand dollars near the same place. Pretty good ranch! Turns out fruit in the summer and gold in the winter.

The Big Canyon mine is running as usual—thirty stamps.

The Vandalia mine is running its cyanide plant and treating forty tons per day. This property has a showing that justifies a 100-ton plant.

Mr. Bell has just returned from London where he has made arrangements to put up a big electric power plant at the junction of Rock creek and the American river. The water for the power is to be obtained from the American river. This plant will be situated about three miles from Placerville and the new company expect to furnish power enough to supply this whole county, and at a price so reasonable that many old mines now lying idle will be enabled to resume operations at a profit. MINER.

Placerville, Feb. 28.

MARIPOSA COUNTY.

(Special Correspondence). — The Mt. Gaines mine has closed down, Geo. Crocker, the owner, instructing cessation of operations.

Hornitos, March 6.

PLACER COUNTY.

(Special Correspondence).—The Hathaway Con. G. M. Co. now has under bond six claims, embracing 6756 feet along the Hathaway ledge, viz: the Plantz, Jacobson, Kirkland, Hathaway, Butts Extension and Eureka. This consolidation was effected through A. B. Eastwood, Supt. of the Hathaway, who has been instrumental in influencing the Standard M. Co. of Bodie to take hold of the new enterprise and supply him with capital sufficient to thoroughly prospect the property at most favorable points. One of the first things to be done was to erect on the site of the old Hathaway mill a plant of greater efficiency and practically new. This work is now going forward, under the superintendence of W. C. D. Body. It will be a modern 20-stamp mill, with provision made to add ten stamps if future developments shall warrant. A new shaft has also been started on one of the other claims, where adequate prospecting machinery has been placed. Supt. Eastwood does not expect to uncover a bonanza. His previous experience at the Hathaway has convinced him that the consolidated claims can be developed into a reliable low-grade proposition, and his efforts will be directed on this line. At the Hathaway shaft, where the chief work is being done, there is a double-reel friction hoist, run by water power, capable of hoisting from a considerable depth beyond the present lowest level—630 feet. Here several miners are running drifts under contract. The Hathaway is near the old town of Ophir. About thirty men will be employed after the new mill starts.

Work at the Gold Blossom, one mile from the Hathaway, is now partially suspended, awaiting development, under contract, in the mine, in the way of running drifts. There is a fine equipment on this claim, consisting of a 20-stamp mill, double-reel hoist, etc. The vertical shaft is 400 feet deep. The property is owned by G. A. Wiltsee, the C. F. Reed estate and others. J. E. Walsh of Auburn is Supt.; J. C. Dirlam, foreman of mill.

The buildings which covered the equipment of the Grass Ravine, or old Black mine, near the Gold Blossom, were destroyed by fire one year ago and have not been rebuilt. The hoist is temporarily housed in a shack made from corrugated iron left over after the fire. There has been no attempt to reconstruct the 5-stamp mill, and none will be made until there has been greater development in the mine. The shaft, now 325 feet deep, is being sunk under contract, and will be continued to a depth of 450 feet before drifting. This property is owned by the White Sewing Machine Co. and other parties of Cleveland, O., with Dr. T. W. Waterhouse of Newcastle as Supt.

It is doubtful if there are many finer prospecting outfits in the State than that on the Three Stars property, seven miles west of Auburn. It is the policy of this company to develop an extensive mine before a mill is erected. There are three shafts—the Three Stars or south shaft, the Belmont or north shaft and the Elmont or west shaft. Each is equipped with an excellent friction hoist, run by compressed air. The air compressors are run by water, and two of them are stationed in the large machine shop of the company, centrally located as to the various shafts. The machine shop is exceptionally well equipped with lathes and labor-saving devices. One that particularly attracted your correspondent's attention was a trip hammer made from a condemned power-drilling machine. By its use the blacksmith can shape and sharpen many of his drills in less than half the time required by the ordinary method. At the Three Stars vertical shaft a depth of 725 feet has been attained; at the Elmont vertical, 524 feet; and at the Belmont incline, 500 feet. Work is proceeding at each shaft, except the Elmont. The company has a system of keeping a close record of the work accomplished by its men in sinking and running drifts, and offers a bonus for every foot attained in excess of a certain standard. This policy serves as a fine stimulus to the miners. At present thirty men are employed. E. J. Kendall is Supt. The property is owned by Senator E. W. Chapman and associates.

Auburn, March 5.

SHASTA COUNTY.

(Special Correspondence).—Near Keswick, on the Cape Nome claim, Thos. Lewis is employing four men and has an 85-foot tunnel on a 5-foot ledge of low-grade ore.

In Old Diggings district Lewis & Co. are driving a tunnel on a ledge of copper ore that assays $1.60 in gold and a high percentage in copper.

In the Bennington group Supt. Foster has cleaned out the old works, and in sinking a winze has found the pay shoot, from which he is getting high-grade ore. An assorted shipment of forty tons is being made this week.

A half interest in the Treasure mine, near Whiskytown, has been bonded to J. S. Manlove, who owns the other half interest, and work will be resumed shortly.

The Summit mine, near Whiskytown, owned by Donihue & Payne, has a tunnel 140 feet in good formation. This is an extension of the Treasure mine.

On the Anaconda mine, in Old Diggings district, Lewis & Co. are running a tunnel on a ledge that assays 8% copper.

Work will begin shortly on the long-abandoned Mt. Queen mine, near Shasta.

The Pacific M. & D. Co. have secured a bond for one year on the Spalding property, near Shasta, for $4000. A San Francisco company will develop the claim.

Redding, March 6.

The Mammoth-Garfield M. Co. proposes to sell a part of its mill site and to take over certain shares of the Alta Sierra G. M. Co., and will have a meeting at its San Francisco office on the 19th inst.

TUOLUMNE COUNTY.

(Special Correspondence).—South of the Tuolumne river the Groveland and Big Oak Flat district shows that place a favorite with mining capital. Twenty months ago there was but one mine in operation, the Kanaka; now there are upwards of twenty within a radius of eight miles of Groveland at work in a business-like manner.

At the Mt. Jefferson, Supt. J. M. Meighan, the ten 1000-pound stamp mill has been started and there is a large body of good mill rock to work on.

The Rhode Island, Supt. Sylvester Carlon, ground was broken Jan. 1st. The three-compartment shaft is sunk 110 feet. A vein prospecting well has been uncovered 60 feet on the hanging wall side, which will be caught by a crosscut on the 100-foot level as soon as the hoist is completed and machinery in place. An 85 H. P. boiler, 16x60, eighty-four flues, is on the ground.

The Mississippi at Big Oak Flat, two miles southwest, is another property belonging to the Rhode Island people. Here the hoist and machinery have been completed and are in operation. The shaft is down 110 feet. This work is in charge of William Jones of the Rhode Island, John McLaughlin having charge of the development work. The general management of this property and the Rhode Island is in charge of Sylvester Carlon. About fifty men are employed.

At the Accident operations have been

resumed after a shut down caused by lack of wood during the season of bad roads. Sinking and drifting are going on and the time when a mill will be needed approaches.

The Little Wonder, in charge of Messrs. Milligan and McCallum of a Scotch syndicate, is operating full-handed again, having just installed new hoisting machinery.

Groveland, March 1.

COLORADO.

BOULDER COUNTY.

At Boulder the Caribou mine is to be unwatered; a contract is locally reported to have been let for $60,000.

CHAFFEE COUNTY.

(Special Correspondence).—One of the greatest strikes in the Granite district was made during the past week in the Magenta mine. In the west drift, about 65 feet from the shaft, 6 to 8 inches of high-grade ore has been cut, carrying a large amount of free gold. Assay returns show a value of $280 per ton after the free gold had been extracted from the sample. This ore chute was cut at a distance of about 400 feet from the surface and, provided that the ore continues to the surface, the Magenta will be one of the biggest mines in the district.

The Belle of Granite shaft has a depth of 220 feet and has been in ore 45 feet. The pay streak averages about 5 inches and the ore being taken from the bottom of the shaft averages twenty ounces gold and from 15% to 20% copper per ton.

Granite, Colo., March 3.

GILPIN COUNTY.

At Central City Mgr. Knowles of the Crown Point and Virginia property, whose shaft buildings and machinery were destroyed by fire last week, will rebuild.

McFarlane & Co. of Black Hawk will change from twenty-five slow to twenty-five fast-drop stamps at the Wilkie mill, at Idaho Springs. A controlling interest in that property is now held by the Colorado-California Shareholding M. & M. Co.

HINSDALE COUNTY.

The Gold Run cyanide plant is to be increased to admit placing six more tanks.

The Cimarron mill will be in full operation again by April 1 with nearly double its former capacity.

LAS ANIMAS COUNTY.

Copper City, in the Carriso mining district, is attracting attention. It is fifty-eight miles from Clayton, N. M. The ore is in a banket vein of silver, copper and gold, which is said to run $150 to the ton.

OURAY COUNTY.

The Guston mine, Ironton district, is to be sold by its owners, a London company, to J. B. Hays of Pittsburg. It was formerly a profitable producer of silver, but has been shut down for some years.

SAN MIGUEL COUNTY.

The new Smuggler-Union mill is to be equipped with automatic stokers.

The Four Metals Co. will put up a mill to treat the ore from its Palmyra group. The ore in the main vein is about 3 feet wide and is said to average $200 per ton.

Work on the new mill on the Gertrude has begun.

The San Juan Gold & Silver Recovery Co., one mile from Telluride, proposes increase of its cyanide plant to 200 tons in twenty-four hours. The tailings are principally from the Smuggler-Union mill, and have been washing down and settling on the placer for the past twelve or fifteen years, and it is figured that there are between 200,000 and 300,000 tons of them. The News says tests made before the placer was purchased by the present company showed the tailings to carry from $5 to $6 per ton in gold and silver, while assays previous to that gave values as high as $14 to the ton. The company is also handling the tailings which are coming from the Smuggler-Union mills.

TELLER COUNTY.

The Altamont and Deadwood companies have consolidated. O. H. Shoup is secretary and treasurer.

The February tonnage of Cripple Creek district amounted to 41,800, of a value of $2,296,700. Following are figures of the ore treated by the various mills and smelters:

	Tons.	Average Value.	Valuation.
Arequa	2,550	$24	$61,200
Brodie.....	600	30	18,000
El Paso	3,000	30	90,000
Metallic.....	8,500	20	170,000
National.....	1,650	35	122,500
Colo.-Phila	8,500	30	255,000
All Smelters..	17,000	90	1,530,000
Miscellaneous..	....	..	50,000

IDAHO.

IDAHO COUNTY.

J. A. Wood, Supt. Iola mine, says there are 2500 feet of tunnel workings on the property. A strike has been made in the lower workings at the foot of a 100-foot shaft. There is a thirty-ton mill at the Iola. Thirty men are employed. The snowfall generally throughout that region is very light.

MONTANA.

MADISON COUNTY.

Elling & Morris propose to build a 250-ton concentrator near Perry to treat the product of the Clipper group of mines.

The Clipper at Pony is probably the deepest gold mine in the State. It is on the side of a mountain and there is a drift in from the base of the latter about 2000 feet, which gains about 1 foot depth from the surface every foot it goes in, hence has opened the mine at a depth that would require a shaft about 2000 feet deep to reach. The tunnel has advantages over a shaft as a means of drainage. The three ledges in the mines are parallel and run east and west. The ore assays from $5 upwards in gold.

PARK COUNTY.

The Montana Coal & Coke Co. and the Butte & Yellowstone Co. consolidate and will increase the number of coke ovens at Horr and Aldridge to 300.

NEVADA.

LINCOLN COUNTY.

Mgr. Dooley of the Johnny group at Stateline has decided on the erection of a new mill.

The St. George Copper M. Co. has shipped to Modena 50,714 pounds of copper ore and 8760 pounds of regulus. The smelter has closed down pending the arrival of a new water jacket.

STOREY COUNTY.

The fact that there is a standing offer of $8000 for the machinery at the Alta mine, while the entire stock at the present quotations represents a total value of only $4000 for the property, is to the Virginia Chronicle another illustration of the vagaries of mining stock speculation. The Alta machinery includes a fine steam hoist pump—the best pump plant on the lode—and a 20-stamp mill, all in first-class order and costing originally over $250,000. The Alta shaft was sunk to a depth of 2180 feet, developing large bodies of low-grade ore in explorations on the lower levels. The fact that after the suspension of pumping in the Yellow Jacket and other Gold Hill mines the pump plant at the Alta demonstrated that it could hold the water, unaided, down to the 2150 level practically illustrated its efficiency. The total assessments levied by the Alta Co. to date approximate $4,000,000, of which $300,000 was paid for the Lady Washington, Keystone and ground claimed by the Justice Co.

WASHOE COUNTY.

W. D. Linton is shipping limestone for flux to the Reno Reduction Works, which are locally credited with "turning out 1000 pounds of bullion per day."

NEW MEXICO.

SANTA FE COUNTY.

Supt. Bigot of the Ortiz mine, Dolores, reports resumption of work. The shaft is down 430 feet. Ore running $3 to $50 per ton is being treated. Mr. Bigot was recently held up on his way from Dolores to the Santa Fe Railroad and a 51-ounce gold brick taken from him by a masked robber.

OREGON.

BAKER COUNTY.

J. C. Young of Sumpter says within three years thousands of miners will be at work all the way from Sumpter to Prineville.

Mgr. Hayes of the Bonanza mine declines to verify the statement that the mine has been sold to Eastern men for $1,500,000.

LINN COUNTY.

The Champion mine, Bohemia, is sold by the Hartford M. Co. of Chicago to Benham & Alkins of Tacoma, Wash., for $30,000.

UTAH.

PIUTE COUNTY.

(Special Correspondence).—The Dalton mine, under the management of O. R. Young, of Salt Lake City, has about 2500 feet of development, divided among tunnels, shafts and winzes. While not yet a regular producer, the Dalton has uncovered some good ore, bearing gold, silver and lead.

Marysvale, March 2.

SUMMIT COUNTY.

(Special Correspondence).—The Ontario is now operating with a force of 170 men at the mine and about fifty men at the Marsac mill, which is running on Ontario ores. At present over 100 tons per day are hoisted through the No. 3, or main working shaft, which sinks 1500 feet vertically in proximity to the mineralized fissure. The vein dips westward and the position of the shaft is such as to strike the vein at the 1500 level. At each 100-foot station crosscuts connect the shaft with the ore body. On the latter there are from 3000 to 4000 feet of drifting at each corresponding level. The 600-foot level constitutes what was originally drain tunnel No. 1, which runs northward from the shaft, coming to the surface in the gulch below; it also extends southward, through the grounds of the Daly mine, and connecting with the Daly-West still farther on, making a tunnel about three miles in length. It forms the 600 level in the Ontario, the 800 in the Daly and the 1200 in the Daly-West. It now carries no water, but is used solely for ore transportation. Cutting under the Ontario workings, a few feet below the 1500-foot level, is the great Ontario drain tunnel, running eastward from the western section of the Ontario grounds, emptying a great volume of water into a depression three miles east of the Ontario shaft, and is four miles from head to discharge. This drains the greater area of Park City district and was completed in 1893. For ten years previous to the latter date, a great pumping engine, having one 38½-inch high-pressure and one 70-inch low-pressure cylinder, with 10-foot stroke, operating a double line of 20-inch pumps, lifted 2500 gallons of water per minute, requiring over 100 tons of coal per day for power; and yet those facilities were not adequate to cope with the surfeit of water. But in those days the ores averaged about 150 ounces silver to the ton, with good lead values added. The ores carrying such values were found from the surface down to the 700 and 800-foot levels and along the strike of the vein for 2000 and 3000 feet. While these upper levels are still shipping some ore, they are pretty well stoped out.

The main production at present comes from the stopes from the 9th to the 15th level. The workings from the 10th level upward connect with the Daly workings on the south, and the drifts on the 12th, 14th and 15th are being pushed for similar connection. The main fissure narrows in some places and widens in others, carrying streaks of irregular width and varying value; and there are offshoots and deflections from the main ledge, and there are parallel veins. The system of timbering in the stopes is necessarily one of adaptation to the peculiar forms of ore bodies. The milling ores now being produced are said to run about forty ounces in silver and not high in lead; the shipping ores run about seventy ounces silver and 10% lead, with small values of copper and gold.

In the shaft house a suction air pump operates, carrying the foul air from each level through sheet-iron pipes, thus creating a circulation that supplies the mine with good air.

The Marsac mill, operating on Ontario ores, has crushers, a battery of thirty stamps, revolving driers, Stetefeldt roasting furnaces, the fuel being supplied by a Taylor coal gas producer. The ore, crushed to a fine mesh, passes through driers and is elevated and fed to the furnaces through automatic, sifting feeders. The material passes from the furnace in the form of a chloridized pulp, which is then subjected to the various methods of leaching and chemical action prescribed by the process, which includes solutions of hypo-sulphite of soda and hypo-sulphate of copper, the final product being a sulphide of silver, which is turned over to the refinery, an adjunct of the same mill. About sixty-five tons of ore per day are milled. It is estimated that Ontario underground workings aggregate forty-five miles of tunnels, drifts, upraises and stopes one set high.

The Silver King is about two miles west of the Ontario, its surface improvements being in a separate canyon basin. The ore here is a silver-lead carbonate in some sections, with large bodies of galena in others. The ore body is in the form of a rather flat ledge, between a lime hanging wall and a quartzite foot wall. The mine is opened through a 1300-foot vertical, three-compartment shaft, from which levels run to the ledge at 700, 900, 1000 and 1200 stations, the vein being of sufficient inclination for this plan of work. On the 9th level, which I went through, the work was extensive, the face of ore being four sets high in places, though the same was interspersed here and there with small barren strata. The ore being produced here is a carbonate, in the main, but with bunches of galena of varying sizes all through. The ore is classified as it is broken, the first grade being for shipment direct to the smelter and the second grade being sent down to the ore bins at the mill. Similar production likewise goes on at the 7th, 10th and 12th. On the 13th level the work of development and exploration is in progress.

A covered tramway track leads from the shaft house a few hundred feet to the ore bins, the latter having a capacity of 2500 tons. There are twenty-one compartments, each one terminating in a chute, below which ore cars are loaded and dumped into the two Blake crushers on the top floor of the mill. From here the material works its way automatically down through the mill, resulting in a fine concentrate on the lower floor. Below the crushers are two sets of Cornish rolls, 14x36; two sets of fine rolls of same dimensions; revolving screens which separate the fine from the coarse before passing to the sixteen jigs. From the jigs the material is carried to the finishing rolls through six perpendicular elevators. It is then fed through 5-foot Huntington grinders, of which there are four. A large proportion of the jig product—that containing the heavy lead values — is shipped to the smelter in that form. The balance passes through the Huntingtons, as above stated. On the lower floor are six Wilfley tables for the coarse work and five Frue vanners for the finer product. But just above the vanner floor is a hydraulic classifier, 60 feet long, divided into ten compartments. This receives the product of the Huntingtons, sizing it to different grades from 18 to 200 mesh, adapting it to the different tables, each of which is set for a particular grade of work. The classifier mentioned was designed by J. B. Fleming, mill superintendent, under whose directions the entire mill equipment was set up. The slime tailings from the concentrators pass to twenty-seven canvas tables, each 55 feet long and 2 feet wide, on which a substantial saving is made. The mill, which has a capacity of 250 tons of ore per day, has a boiler force of 250 H. P., a cross-compound Corliss engine of 150 H. P. At present only about seventy-five tons per day are being milled, about eighty tons per day going to the smelter direct. The smelting ore runs from 40% to 45% lead and fifty to sixty ounces silver, the milling ores running from 18% to 20% lead and an average of twenty ounces silver per ton. The concentrates run about 45% lead and fifty to fifty-five ounces silver. The January shipments amounted to 4,878,940 pounds of crude ore and 1,066,650 pounds of concentrates. It will be seen from the above that the Silver King is not only a rich producer, but has one of the largest and most thoroughly equipped concentrating mills in the country.

The Daly-West shaft house is 600 feet higher in elevation than that of the Ontario. At the former is a Bullock hoisting engine, 20-inch diameter by 60-inch stroke; and an Ingersoll air compressor, duplex, tandem, with 16x42 cylinders. The Daly-West shaft is double-compartment, vertical, and 1400 feet deep. Levels run to the vein at the 900, 1200 and 1400-foot stations. At the 900 station the ore body is found 275 feet to the west, at the 1200 it is 500 feet from the shaft and 700 feet from it on the 1400 level. The position and structure of the ledge resembles that of the Silver King, being greatly flattened in most places and between quite similar walls; but the ores in the Daly-West are mainly sulphides, carrying silver, lead and some zinc—there being practically no carbonates, as are found in the Silver King. The Daly-West high-grade ores come mostly from the 900-foot level, running from 22% to 25% lead and from sixty-one to sixty-eight ounces silver. These ores are brought to the shaft in cars and sent down to the 1200-foot level, thence hauled to the surface through the tunnel which passes from Daly-West grounds, through the Daly and Ontario to the railroad track in the upper part of Park City, a distance of three miles. The milling ores come chiefly from the 1200 and 1400 levels, are hoisted to the surface and run through the mill, which is located near the shaft house. The mill product is a silver-lead concentrate that runs 25% to 30% lead and forty-five to fifty ounces silver. The mill is equipped with crushers, rolls, jigs, revolving sizers, classifiers and ten Wilfley tables. Over 100 tons per day are milled and 75 tons per day are shipped to the smelter. The concentrate shipments amount to about thirty tons per day. The workings in the mine are extensive, by which it is seen that the ground worked out has contained great masses of ore and that the same solid ledges are exposed at the face of the work on all three levels and in the stopes. Within the past year 7792 tons of ore were sent to the smelters, returns from which were 495,484 ounces silver, 3,988,891 pounds lead, 461,288 pounds copper and 406 ounces gold, of the total value of $334,445. At the mill 17,169 tons were reduced to 4785 tons of concentrates, the latter containing 33% lead, forty-nine ounces silver to the ton, selling for $194,-571. The gross proceeds of the year were $549,721, the expenditures for labor and supplies amounting to $171,801, leaving net proceeds of $377,911.

The Anchor joins the Daly-West on the west, the shaft house of the former being several hundred feet higher than that of the latter. The Anchor shaft sinks 1600 feet. On the 1200 level a tunnel runs 1¼ miles to surface at a point down the gulch where the Anchor mill is located. All the Anchor ores now pro-

duced are milled, being hauled out through the tunnel. An upraise from the 1200 level, on an incline 400 feet long, to the seventh level, is all that distance in ore. A large amount of stoping has been done between the thirteenth and fourteenth, an incline connecting these two levels on the vein. The vein on which the upraise runs is a different one from that opened on the thirteenth. The former dips to the south and the latter to the north. The mill handles about 2400 tons of ore per month, the product being 600 tons of concentrates. The ores are a sulphide of iron, lead, zinc and copper, the concentrates running 45% lead. The mill equipment is quite similar to that of other mills described.

In general, Park City district employs about 1000 men in the mines and mills; ships 6000 to 7000 tons per month, three-fourths of which is crude ore and one-fourth concentrates.

The Rio Grande Western Railway Co. are changing their Salt Lake–Park City line to a broad gauge, building 6½ miles of new track near the summit, to reduce the grade so that it will not exceed 4% at any point. Instead of crossing the summit at the elevation of the old roadbed, the new track will pass through a 1200-foot tunnel 175 feet lower. WASCOTT.

Park City, Feb. 24.

TOOELE COUNTY.

(Special Correspondence).—Dry Canyon Camp: The Mono mine produced heavily in early days. The old workings consisted of an incline shaft 900 feet deep. A tunnel is being driven to cut the ore body below the old workings. It is in 2400 feet. The ores carry lead and horn silver and probably some telluride of gold. Shipments consist of an occasional car of ore. It is owned by M. Gisborn of Salt Lake City.

The Treasure is likewise an old timer and has an 1800-foot incline shaft, with some drifting therefrom, to show for its former activity. It is now in the hands of lessees.

The Kearsarge, also worked by leasers, is shipping some high grade ore, carrying gold, silver and lead.

The Mammon, worked by W. C. Reynolds, G. Brande and others, recently shipped ore running $90 per ton.

The Utah Queen, sold two months ago by G. Cameron to a company managed by F. Morehouse of Salt Lake City, brought $40,000. It is shipping some ore that runs well in silver and lead.

The Hefner tunnel, owned by Garber & Hamilton, is being run to tap the Queen of Hills mine, which they also own. They are developing and blocking out ore and are said to ship enough to pay all current expenses of the properties. The tunnel, in 1100 feet, has cut four ore shoots. It is a silver-lead proposition. WASCOTT.

Dry Canyon, Feb. 21.

UINTAH COUNTY.

The group of gilsonite claims upon the Utah–Colorado boundary line is sold by Mgr. Seaboldt to Eastern investors for $200,000.

UTAH COUNTY.

Owners of mining claims near Alpine have grouped their claims and incorporated under the name of the Pacific M. & M. Co.; capital stock, $20,000; 200,000 shares. O. Hudson is Mgr.

WASHINGTON.

FERRY COUNTY.

J. Cody, Supt. Flagstaff G. M. Co., operating the El Capitan mine at Cody, says his samples runs from $1.03 to $6.10 a ton gold.

WYOMING.

W. E. Cody—"Buffalo Bill"—says that he and Gen. Miles will put in a $1,000,000 smelter at Grand Encampment.

CARBON COUNTY.

The chief officials of the Standard Oil Co. are locally alleged to be the new purchasers of the Ferris–Haggarty copper mine, Battle Lake district. They are represented to intend to pay the present owners of the mine $1,500,000 this month.

FOREIGN.

AUSTRALIA.

NEW SOUTH WALES.

The semi-annual report of the Broken Hill Proprietary to Jan. 1st, 1900, shows that the gross profit for the half year amounted to £144,492 12s 2d, which, after deducting £34,130 7s 9d for depreciation upon the various plants, left a net profit of £110,362 4s 5d. The sum of £62,935 1s 9d was expended in construction, and two dividends, each of 1s per share, or £96,000 in all, were distributed. After making due provision for all outstanding liabilities there remain assets in cash, bullion and other convertible stocks to the total value of £426,359 13s 11d. The output of silver was 2,502,463 ounces fine, against 2,218,234 ounces for the previous half year, and of lead 17,831 tons, as against 17,823 tons for the former period. At Port Pirie the tonnage of ore, concentrates, etc., smelted, amounted to 95,154 tons, as compared with 100,064 tons in the previous half year. This yielded an average of lead 18.48 units per ton, silver 22.68 ounces per ton. The refinery treated 18,980.25 tons of silver-lead bullion, producing silver, fine, 2,568,566 ounces; gold, fine, 9675.88 ounces; soft lead, 18,240.15 tons; antimonial metal, 303,72 tons, and by-products containing lead 1.55 tons. The gold parting plant treated 361,249 ounces dore silver, from which were separated 9675.88 ounces fine gold.

BRITISH COLUMBIA.

In London is formed an association of British companies owning mines in the Slocan district to act with the Silver-Lead Mine Owners' Association, the English organization insisting upon the reopening of the mines, concessions to be made the British shareholders tiring of the strike, with its resulting absence of dividends.

MEXICO.

(Special Correspondence).—At the property of the Guanajuato Con. M. & M. Co. of Guanajuato the output of the mine is averaging $22,000 per month. The intention is in a short time to double the capacity of the mill. The underground workings in the Sierra mine measure between 35,000 and 40,000 feet, with a working tunnel 12x14 5500 feet in length.

Guanajuato, Feb. 20.

J. H. Wood, secretary Cobre Grande Copper Co., Phœnix, Arizona, says: "The Cobre Grande Copper Co. is the owner of the producing copper mines and smelter in the Cananea mountains, Sonora. The company has paid and deposited in the Mexican courts $50,000, and is obligated to pay the balance. No part of the purchasers' contract obligation is in default."

Two Republics: According to the official organ of the State of Guerrero, W. Hughes, agent for R. E. Briggs, Mexico City, has denounced a gold, silver and copper bearing ledge, to which he has given the name of La Alta, in the vicinity of Totolapan, district of Coyuca, near the Mexico, Cuernavaca & Pacific Railway. ——The National Mexican M. & D. Co. has organized to work the El Plomo group in the district of Altar, State of Sonora. W. Jackson represents the company at Altar.

THE KLONDIKE.

The Yukon Sun, Dawson, Feb. 6, says that the cleanup this spring on Sulphur creek will amount to $2,000,000. It gives account of claims being worked from the 70 above Discovery to 33 below. Many steam thawers are going and dumps had been formed up to that time amounting to 14,000 buckets.

Industrial Notes.

—An electric power plant is to be installed on the McCloud river, Shasta Co., Cal., twenty-two miles from Redding.

—Baker City, Or., will receive sealed proposals until May 1 for gravity water bonds, to the amount of $100,000, to run twenty years at 5%.

—There are 6 iron foundries in Arizona, 88 in California, 30 in Colorado, 4 in Nevada, 6 in Oregon, 3 in Idaho, 8 in Montana, 22 in Washington, 12 in Utah.

—At Frisco, Colo., Ault & Wiborg of Cincinnati, owners of the Excelsior mine, will put in a 3000 H. P. electric plant to supply light and power to the mine.

—The world's production of pig iron in 1899 was 40,560,000 metric tons; 36,507,487 tons in 1898. The United States now stands at the head of all nations as an iron producer.

—The Mexican Central Ry. was able to show fixed charges earned for 1899 by reason of the advance in silver; had the price of silver in 1899 been the same as in 1898 the net result in gold would have been a deficit of $60,000, instead of a surplus of $99,000.

—The C. P. and later the S. P. Ry. has been using a circuitous route around Great Salt Lake, Utah, for thirty years. Survey is now being made for a cut-off across the lake from Lucin to Ogden, Utah, to connect with the old S. P. line at a point just north of the Ogden river. The cost will be considerable, involving building a steel bridge 19½ miles long upon piling driven into the bed of the lake, some necessarily 50 to 80 feet in length.

Books Received.

"The Ore Deposits of the United States and Canada," Jas. F. Kemp, 3rd edition, pp. 480, an enlarged and rewritten edition of a work that has already had deserved sale, and a book that can be recommended. As will be noted, the scope of the work now includes Canada, the Yukon region being given attention; The Scientific Publishing Co., N. Y. City; $5.

Personal.

J. J. CRAWFORD has returned to San Francisco from Placerville, Cal.

H. P. GORDON has charge of a mine at Plymouth, Amador county, Cal.

W. W. ALLIS, Pres. E. P. Allis Co., Milwaukee, Wis., is visiting San Francisco.

H. C. WOODROW has bonded the Texas mine, Shasta county, Cal., and has gone to Boston for capital to take up the project.

J. H. CONRAD is inspecting the Madisonian mine at Norris, Montana, for the Leiters of Chicago, who have an option on it.

G. P. KELLER, maker of the Keller assay balance, has opened a shop in Salt Lake City, Utah, to enter business for himself.

T. H. SIMMONDS, formerly Supt. Empire mine, Grass Valley, Cal., will start with his family for a tour in Europe about March 15th.

PAUL E. JOHNSON is at Madera, Cal. He says the B. C. Copper Co.'s smelter at Greenwood, B. C., will blow in about Aug. 1, 1900.

JOHN HARNAN, recently of the Portland G. M. Co., Colorado Springs, Colo., is Gen. Mgr. Colorado & Deadwood M. Co., Deadwood, S. D.

T. W. BROOKS, Pres. Yuma & Colorado R. G. D. Co., is in San Francisco to buy dredging machinery for his property near Yuma, Arizona.

S. H. JOHNSON JR., who has been experimenting with the bromo-cyanide process at Republic, Wash., is in San Francisco, en route to London.

GEO. BAYHA, Pres. North Cal. Investment Co., developing extensive copper properties at Stillwater, Cal., is on a visit to the mines from Cologne, Germany.

CHARLES KIRCHHOFF of New York will have charge of the statistical work in connection with the smelting and refining of metals for the Twelfth U. S. Census.

C. DOBBELSTEIN, Gen. Mgr. Gray Rocks copper mines, Stillwater, Cal., returned to the mines last week from Sutter Creek, Cal., after an examination of the Baliol mine.

SENATOR E. W. CHAPMAN of Placer county, Cal., is spending considerable time at present in superintending his gravel properties near Placerville, El Dorado county, Cal.

H. O. KIRK, representing the Westinghouse Electric Co., is en route to Kobe, where he will represent his company in Japan, Siberia, Korea, China and the Philippines.

P. S. LOZANO of Placer county, Cal., is in Sonora, Mexico, to examine and perfect title to copper properties in which he is joint owner with A. L. Smith, S. Bartlett and others of Auburn, Cal.

PROF. A. VAN DER NAILLEN, who has been for nearly thirty years at the head of his San Francisco school, has gone to Paris, to remain during the Exposition, to note anything new in the mining and engineering line.

PROF. HOBBS thinks it not improbable that when the territory about Hudson's bay is thoroughly explored, a region for profitable diamond mining may be found. He says the soil and geological formation in the Hudson's bay district are decidedly diamondiferous. Some of the stones found have gone as high as 24 carats.

Recently Declared Mining Dividends.

United Verde Copper Co., Arizona, 50c a share; Feb. 27.

Empire State, Idaho, M. & D. Co., monthly dividend, 3%; payable March 15.

Cordeil Zinc & Lead M. Co., monthly dividend, 5c per share; payable March 15.

Wolverine M. Co., Mich., semi-annual dividend, $2 per share; payable April 2.

Daly-West M. Co., Utah, 25 cents per share; payable March 15.

Centennial Eureka M. Co., Utah, final dividend, $16,500; payable March 15.

Commercial Paragraphs.

THE Jeanesville compound condensing pump in the Ibex mines at Leadville was built 15″ and 28″x9″x36″ for 600-foot lift. The mining company reduced the water plungers to 7½″ and put the pump on the 1100-foot level. It is now pumping water 1100 feet, direct lift. It is the highest direct lift now in use in Colorado. It is performing the work with eighty-five pounds steam. A duplicate of this pump, 13″ and 24″x7″x24″, in the Vindicator mine at Independence, Colorado, is pumping 800 feet.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING FEB. 27, 1900.

644,503.—INSECT DESTROYER — F. Dayton, Portland, Or.
644,284. — HORSESHOE — C. G. DeLay, Murphy, Cal.
644,064.—SCHOOL DESK — W. T. Dodd, Walla Walla, Wash.
644,286.—NAIL—J. T. Eyster, Eagleville, Cal.
644,289. — CONCENTRATOR — G. Gates, Jackson, Cal.
644,513.—SOAP HOLDER—W. R. Hall, S. F.
644,521.—DREDGER—D. Jordan, S. F.
644,210.—LOOSE LEAF LEDGER—E. L. McClure, S. F.
644,255.—LOCK—J. C. Meyer, S. F.
644,534.—TONGUE SUPPORT—J. J. Nagley, Marysville, Wash.
644,366. — JOURNAL BEARINGS — A. Newell, Pasadena, Cal.
644,448.—CIRCUIT CLOSER—Nye & McIntosh, Los Angeles, Cal.
644,457.—DREDGER—W. B. Pless, S. F.
644,459.—FISH TRAP NET—T. Redding, Seattle, Wash.
644,450.—INK BOTTLES—E. J. Robinson, Santa Monica, Cal.
644,153.—HOOK AND EYE—A. T. Snell, Los Angeles, Cal.
644,114.—CURTAIN POLE—A. S. Venen, Forest Grove, Or.
644,389.—COIN OPERATED MACHINE—J. L. Wilson, Los Angeles, Cal.
644,390.—COIN OPERATED MACHINE—J. L. Wilson, Los Angeles, Cal.
644,268.—REFRIGERATOR CAR — J. Zobrist, Hanford, Cal.
32,274.—DESIGN—H. L. King, Spokane, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PLOW.—A. G. Carter, Fresno, Cal. No. 643,838. Dated Fed. 20, 1900. This invention relates to improvements in plows. It consists of a frame mounted upon wheels, carrying the plate or cultivating mechanism, with a means for operating the same. A boom has one end connected with the frame, and extends to a distant center with which it is connected, and about which it and the plow frame are caused to to move alternately from one end to the other of its arc of travel. An engine or motor is carried upon this center of motion, and power from this engine is transmitted to actuate the plowing mechanism and cause it to traverse the arc which is transverse to the line of travel of the machine as it progresses from one end of the field to the other. When the plows have traveled through this arc, the driving mechanism is reversed and the plow starts back on its arc of travel just overlapping the arc which has previously been plowed. In this manner a width of ground, nearly double the length of boom, can be plowed during the advance of the engine across the field, and thus a comparatively light engine or motor can be used on soft or marshy land because the engine itself remains stationary while its power is being applied to drive the plows while making their cut, and the forward movement of the engine takes but little more power than is necessary to move itself.

QUICKSILVER FURNACE.—H. C. Davey, Calistoga, Cal. No. 643,839. Feb. 20, 1900. This invention is designed to extract quicksilver and that class of metals from its ores. In the wresting of quicksilver ores, it has been customary to place the ore in the roasting furnaces so that the moisture from the wet ore is expelled from the same exit with the fumes arising from the roasting of the ore, and result has been a very considerable loss of quicksilver on account of the vapors of the quicksilver being carried off by the escaping watery vapor and the formation of mercury soot or acid compounds which make it difficult to properly condense and save the mercury. In some cases the ores have been dried upon exterior tables, and have been placed in the furnace, but this does not avoid this difficulty, since the ore will absorb some moisture from the atmosphere before it goes into the roasting portion of the furnace. In my invention I have formed my furnace with an upper drying chamber, and a lower roasting chamber with direct inter-communication, so that the ore, after being thoroughly and per-

fectly dried at a comparatively low temperature, passes directly into the roasting portion of the furnace, where it is exposed to the higher temperature necessary to separate metal from its combinations.

FARE REGISTERS.—J. G. Miller, San Francisco, Cal. No. 643,879. Dated Feb. 20, 1900. Registering devices are employed upon street cars to indicate the number of fares, tickets, transfers or other representative of money received or for counting and other like purposes where it is desired to keep a registration of all transactions. In the use of such devices upon street cars it is difficult to keep the accounts of various conductors in proper shape, because the conductors are frequently transferred to different cars while the register remains upon the car. It is therefore necessary to take the amount shown by the register whenever a conductor leaves the car and a new one comes on, and at the end of the day it is also necessary when the car goes to the stable to take the final registering of each car as it comes in. The object of this invention is to simplify this matter by providing each conductor with a total register which is adapted to be connected with any of the registering apparatus of any of the cars of the line upon which he is employed, so that he can insert the device and connect it with the permanent mechanism on the car when he starts, and when he leaves the car he can disconnect it and take it with him to the next car, each conductor thus taking his own record with him throughout the day and turning it into the office when his work ceases.

FEEDER FOR THRESHING MACHINE.—James L. Patterson, Madera, Cal., and George T. Hill, Merced, Cal. No. 643,849. Dated Feb. 20, 1900. This invention is for an apparatus which is designed to feed unthreshed straw to the threshing cylinders in that class of machines. It consists of a series of superposed guided boards or fenders standing in inclined planes in a guided case and extending entirely across from side to side of said casing, these boards being connected with oppositely movable cranks whereby the boards are alternately reciprocated in their different planes of motion, and in connection with these are means whereby the straw delivered into the upper part of the machine is gradually moved down and fed continuously to the threshing cylinder by the oppositely reciprocating movements of the feeders.

Latest Market Reports.

SAN FRANCISCO, March 8, 1900.

SILVER—Per oz., Troy: London, 27⅛d (standard ounce, 925 fine); New York, bar silver, 59⅝ cts. (1000 fine); San Francisco, 59⅜; Mexican dollars, 48½c.

The following table shows the amount of gold and total money in circulation at the beginning of each half of the fiscal year from July 1, 1896, to Jan. 1, 1900:

Date.	Gold (coin and certificates) in circulation.	Total money in circulation.
1896—July 1..	$498,449,242	$1,509,725,200
1897—Jan. 1..	555,630,668	1,650,223,400
July 1..	556,432,594	1,646,028,246
1898—Jan. 1..	584,126,049	1,721,100,640
July 1..	696,780,519	1,843,435,749
1899—Jan. 1..	732,980,132	1,897,301,412
July 1..	734,716,728	1,932,484,239
1900—Jan. 1..	779,100,627	1,980,398,170

It is stated to be the intention of the U. S. Treasury Department, as soon as the pending financial bill becomes a law, to expedite as fast as possible the coinage of the silver bullion purchased under the Sherman Act still remaining in the treasury. There is still on hand bullion purchased under this Act costing $78,000,605, and represented by that amount of treasury notes outstanding. The department has been coining this bullion into dollars at the rate of $1,800,000 a month. The financial bill authorizes the coinage of enough of this bullion into subsidiary coins to bring the total subsidiary coinage up to $100,000,000. This will require about $25,000,000 in subsidiary coins. In addition to this the department proposes to increase the coinage of silver dollars to $4,000,000 a month, and the effect will be to have all this bullion coined and all treasury notes retired within a year and a half.

COPPER.—New York: Lake, 1 to 3 casks, 16.75 cash; carload lots, 16½; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.00; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17½@18. Mill copper plates, 21½c; bars, 23½@25c.

LEAD.—New York, $4.70; St. Louis, $4.70; San Francisco, $4.90; pipe 7½, sheet 8¾, bar 6½c. London, Soft Spanish Lead, £16 12s=4.76c per lb.

SPELTER. — New York, $4.70; St. Louis, $4.70; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 22½c; San Francisco, Plumbers', 100-lb. lots, 19c.

IRON. — Pittsburg, American soft—pig—large lots—$25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c.

STEEL.—San Francisco, bar, 12c to 20c per lb.

QUICKSILVER. — New York, $51.75; London, £9 14s; San Francisco, local, $51.50 ℔ flask of 76½ lbs.; export, $47.50.

PLATINUM.—San Francisco, crude, $16 ℔ oz.; manufactured, $19.50@22.00

FERRO-MANGANESE. — San Francisco, ℔ ton, $30.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

TIN.—New York, pig, $34.50; San Francisco, ton lots, 36c; 1000 lbs., 36½c; 500 lbs., 37c; less, 38c; bar tin, ℔ lb., 42½c.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ℔ set; 14 oz., 40s., 11c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

San Francisco Stock Board Sales.

SAN FRANCISCO, March 8, 1900.

9:30 A. M. SESSION.

100 Belcher.....29c	300 Mexican.....24c
300 Caledonia...90c	400 Ophir 79c
100 Challenge...23c	300 Overman....28c
300 Chollar 26c	200 .....27c
100 C. C. & V.$1 60	200 Potosi.....26c
200 Crown P't...15c	400 Seg. Belcher.05c
800 G. & C.....16c	

2:30 P. M. SESSION.

200 Ophir.....78c	100 Belcher.....29c
400 .....77c	100 Utah.....09c
400 G. & C.....16c	700 Overman....27c
150 C. C. & V.$1 55	150 Caledonia....92c
500 Chollar 25c	50 .....93c
100 Potosi 25c	100 Challenge...23c
100 H. & N.....31c	200 Julia.....02c
500 Crown P't...15c	

WANTED.

A Rich Placer proposition, adapted to working by Steam Shovel method. Description to receive attention must be accompanied by reliable reports and references.

ADDRESS:

EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - 426 CALIFORNIA STREET,
SAN FRANCISCO.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

YOUR BUSINESS STRENGTH

is easiest gained by a careful study of the line which you wish to pursue. Don't stop work, but study "after hours" and we guarantee to fit you to succeed through our thorough course of



EDUCATION BY MAIL

in Electrical, Mechanical, Steam, Mining and Civil Engineering; Metallurgy, Art, Architecture, Practical Newspaper Work, English Branches, Stenography, Machine Design and Mechanical Drawing. Low price; easy terms. Mention subjects interested in when writing to

THE UNITED CORRESPONDENCE SCHOOLS,
154, 156, 158 5th Ave., New York, for catalogue 118

Experienced Mining Engineer (age 40) reports on mines and their economical development; ore dressing; processes; mining machinery and mill construction. References. P. O. Box 971, Denver, Colorado.

SITUATIONS WANTED.

By a Practical Miner who is thorough and up to date in working a mine. Can handle men to advantage. Understands milling, concentrating and the erection of all kinds of mining and milling machinery. With some years of experience. Will accept a position to manage a mine or mill. First-class testimonials furnished as to abilities, integrity, etc. Address QUARTZ, care Mining and Scientific Press.

Mining Engineer and Metallurgist, technically educated, with fifteen years of practical experience, is open for a new engagement as expert or superintendent. Specialty the treatment of rebellious silver and gold ores. Experienced in designing, building and running reduction works. Speaks and writes Spanish fluently. Address ALPHONSE BENO, P. O. Box 814, City of Mexico.

Wanted—A Position as Superintendent in a hydraulic mine by a miner who has had twenty years' experience. Best of references as to ability, honesty and sobriety. Address S. O. G., care of Mining and Scientific Press.

Metallurgist and Chemist, technical graduate, fifteen years' practical experience in Mexico and the United States, familiar with the treatment of gold, silver, copper and lead ores, desires engagement. Address METALLURGIST, this office.

WANTED—By an engineer posted in mining and milling, a position as superintendent or manager. Am prepared to plan, erect and operate economically precious metal mills. Sober, reliable. Address W. G., Mining and Scientific Press.

ASSAYER

desires POSITION at a new and promising mine. Salary moderate. Address C. R. T., this office.

Mining and Metallurgical ENGINEER

DESIRES POSITION.

Had long experiences in gold and silver mines and reduction plants. Had charge of stamp mills and cyanide plants. Can furnish best of references. Address CYANIDE, care this office.

NOTICE OF STOCKHOLDERS' MEETING.

A Special Meeting of the Stockholders of the Mammoth-Garfield Gold Mining Company, for the purpose of discussing and taking action on a proposition by the Board of Directors to sell a portion of the company's millsite in Shasta County, California, and also to subscribe on behalf of the company for certain shares of the capital stock of the Alta Sierra Gold Mining Company of California, and to transact such other business as will be brought before the meeting, will be held at the office of the company, Rooms 50 and 54, No. 120 Sutter St., San Francisco, California, at 2 P. M. on Monday, March 19, 1900.

By order of the Board of Directors.

SAM. W. CHEYNEY, Secretary.

February 28, 1900.

WANTED.

WANTED.—A Second-Hand White Howell Roaster, also a Revolving Drier.

Must be in good repair. Address ARTHUR HENDEY, Agent, Copper Chief Mining Company, Jerome, Arizona.

Wanted to Buy, Cheap for Cash,

A GATES OR COMET CRUSHER, NO. 0 TO NO. 5. Must be in good condition. Address, stating price, J. L. D., this office.

Mechanical Draughtsman WANTED.

Thoroughly experienced in mining and metallurgical work and able to show first-class testimonials. Apply to

THE MOUNTAIN COPPER CO., LTD.,
KESWICK, SHASTA CO., CAL.

SOME DEALERS SAY COLUMBUS BUGGY CO.'S VEHICLES



Are too high in price to admit of as much profit as the cheaper grades usually handled by agricultural implement dealers. A cheap vehicle costs just as much freight from the East as a good one, thus you get but little value for your money after paying three profits and freight.

If Columbus Buggy Co.'s vehicles are not on sale in your vicinity please write to the

SAN FRANCISCO HOUSE,
1665-1667 MARKET ST.,
Between 9th and 10th, San Francisco, Cal.

FOR CATALOGUE AND SPECIAL PRICE.

P & B ROOFING

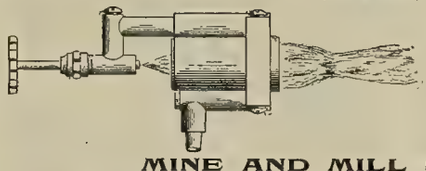
ROOFING is to a building what clothing is to the body. It must protect and it must wear well. To put money in an interior and to save it on the roof of a building is poor economy.

P & B ROOFING possesses all the requirements of a first-class roof covering. It is waterproof, durable, inexpensive, easily laid. Ask your dealer for a circular, or address the makers.

PARAFFINE PAINT CO.,
116 BATTERY ST., SAN FRANCISCO.

Taylor's Coal Oil and Gasoline Burner

(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.

Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

Keep Your Boilers Clean While They Are New. You Know What to Use;

IF NOT, WRITE TO

DEARBORN DRUG & CHEMICAL WORKS,
Offices and Laboratories:
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

FOR SALE.

10 H. P. Gasoline Hoist for Sale.

Complete outfit in good condition. Price low. Address PAUL J. PITNER, Placerville, Cal.

FOR SALE.—DIVIDEND-PAYING, HYDRAULIC placer. Extensive deposits. Old channel gravel, water, pressure, grade, dump, and gold. Rigid investigation invited. Thoroughly legitimate. Banking references. Owner, IDAHO, care of Mining and Scientific Press.

FOR SALE.—DEVELOPMENT INTEREST IN A PROMISING UNDEVELOPED MINE. Good locality; splendid showing. For further particulars, address MINER, care of Editor Mining and Scientific Press.

Mines for Sale.

A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.

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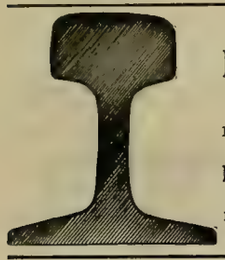
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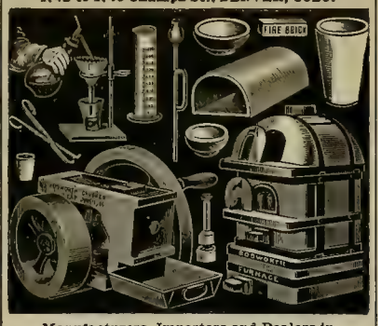
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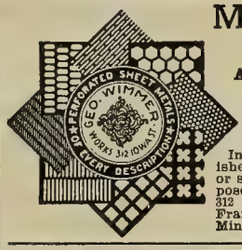
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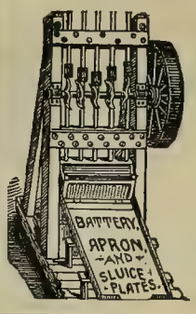
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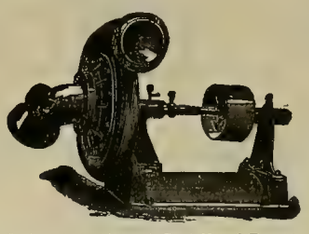


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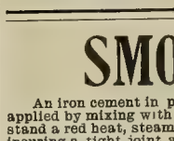
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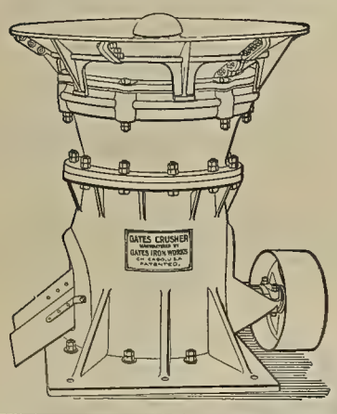
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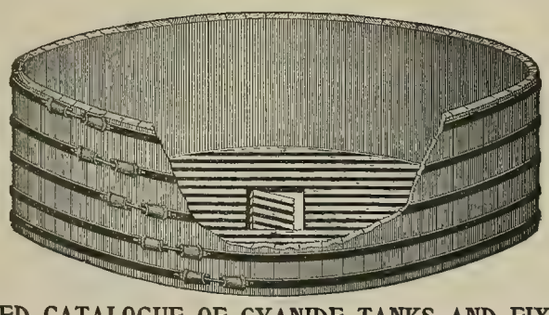
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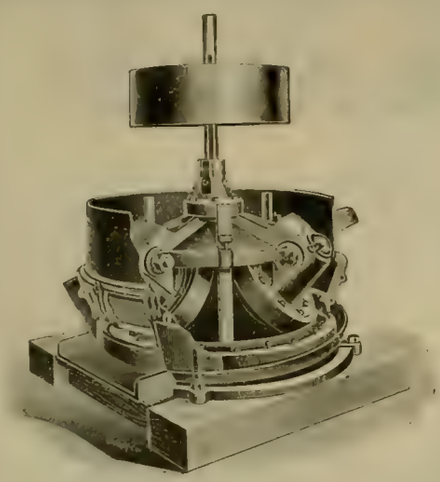
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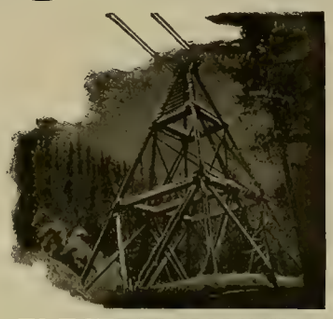
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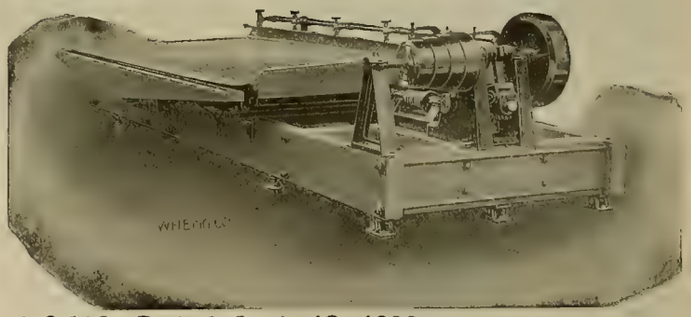
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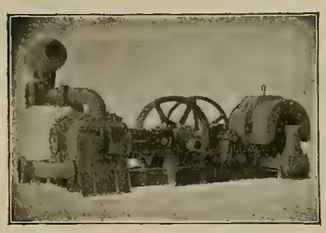
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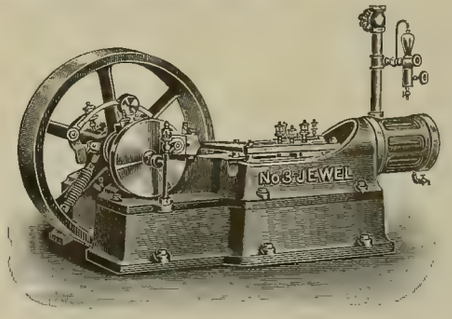
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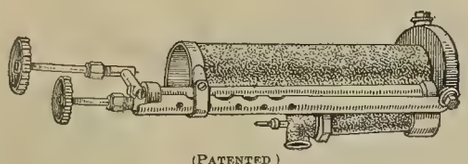


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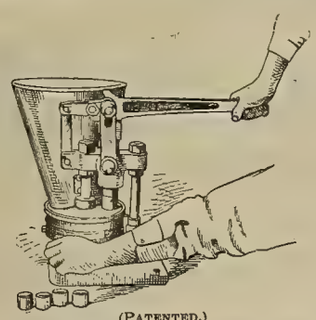
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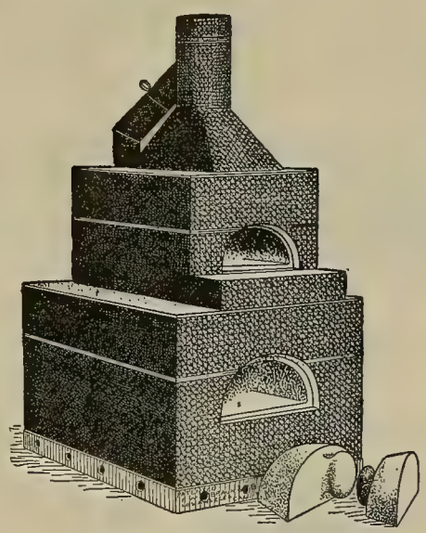
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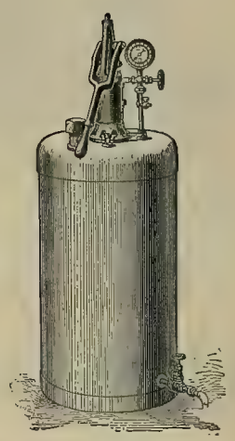
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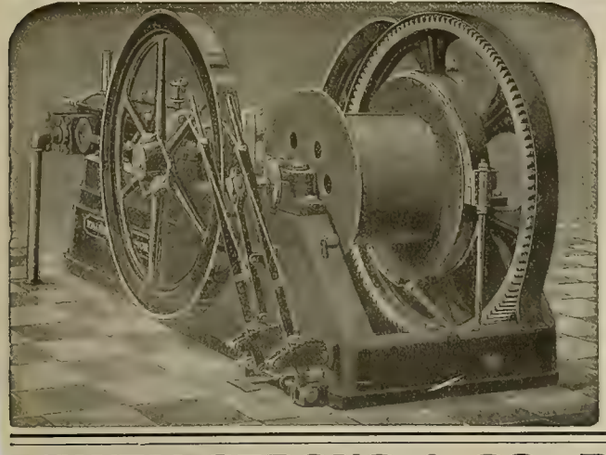
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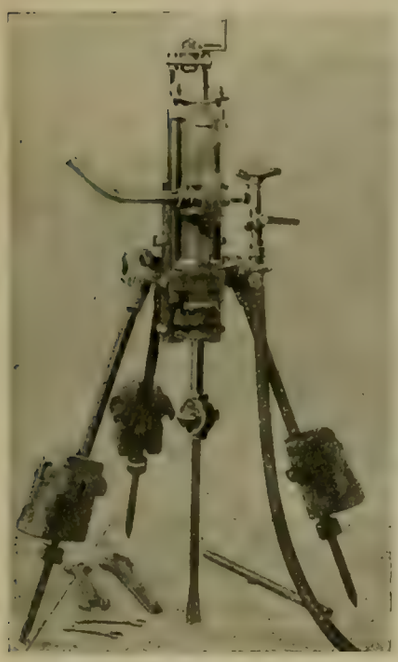
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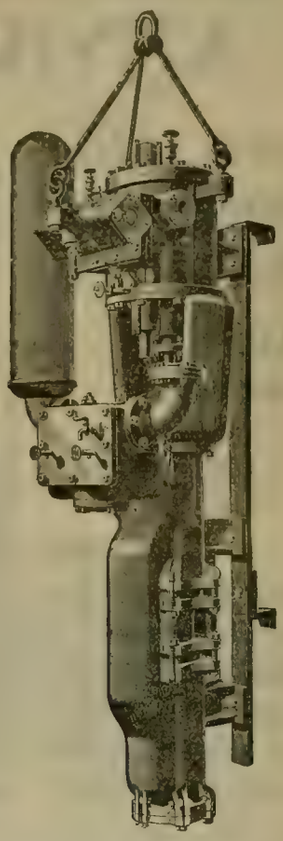
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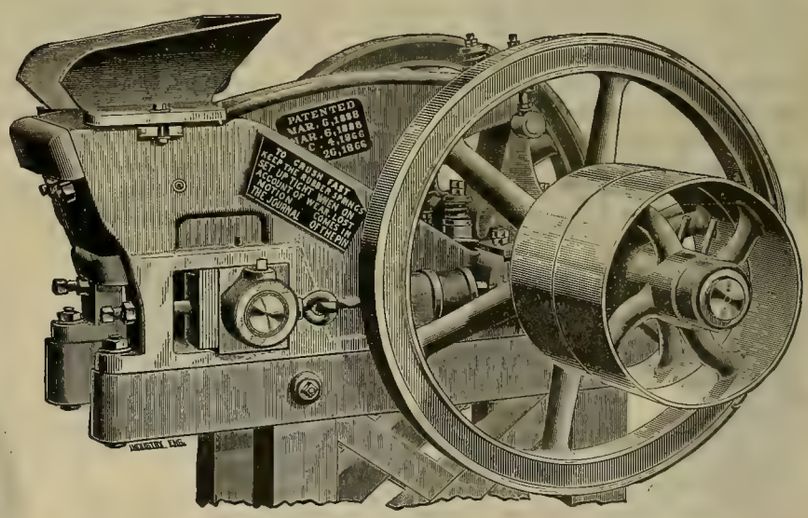
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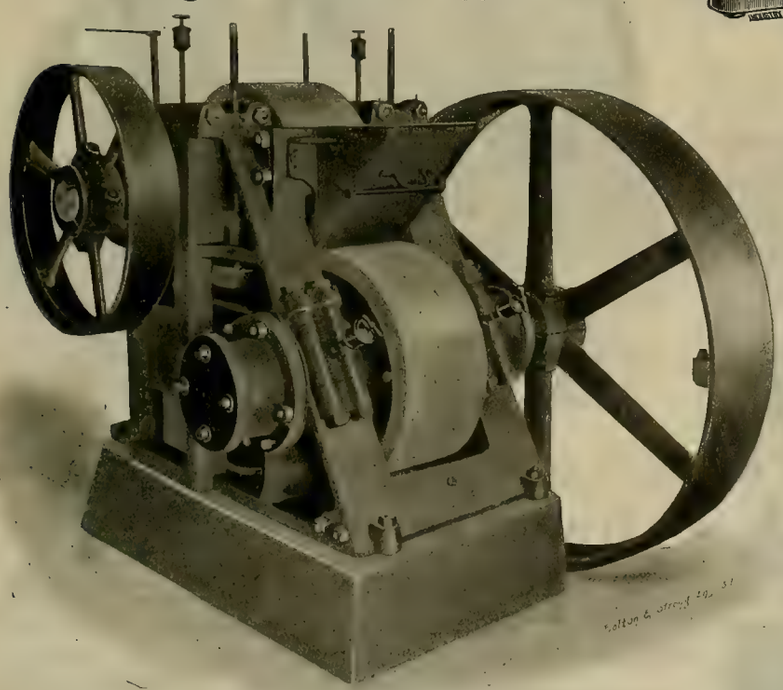
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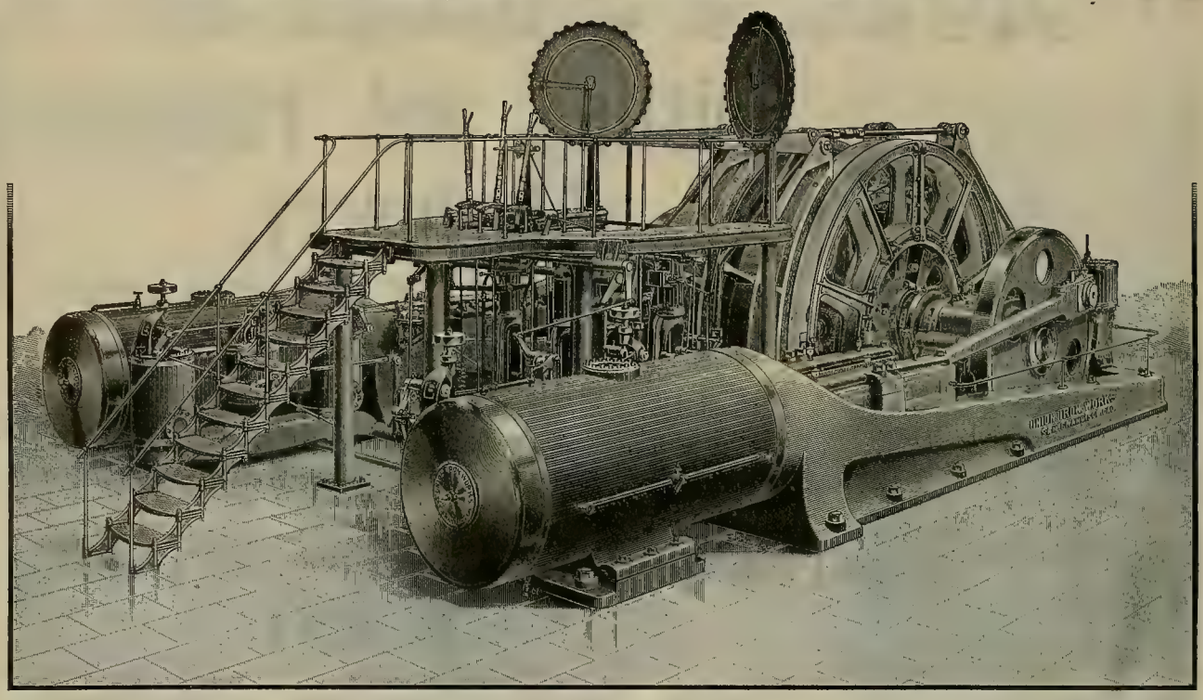
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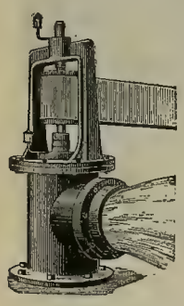
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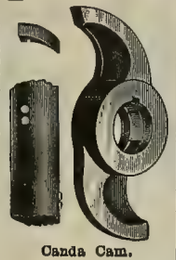
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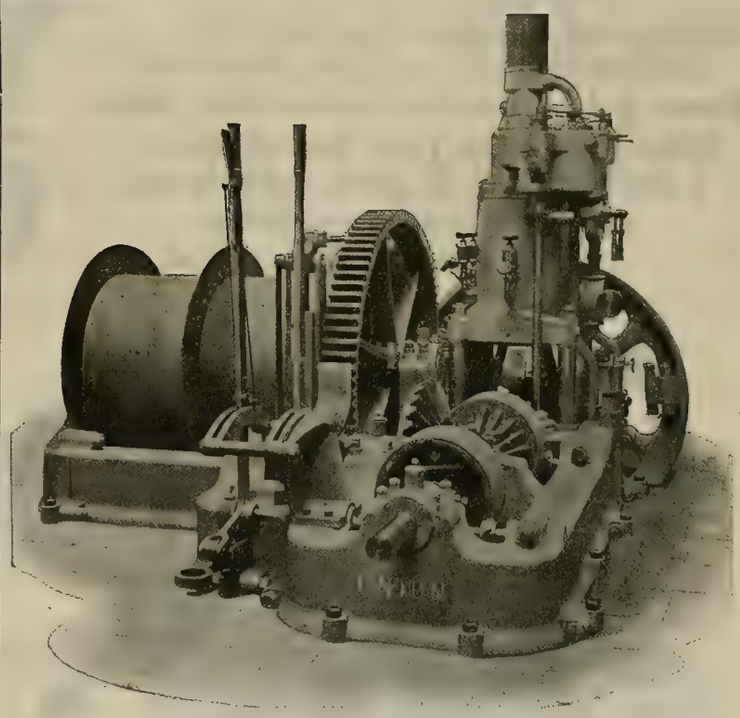
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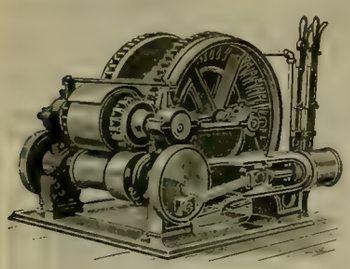
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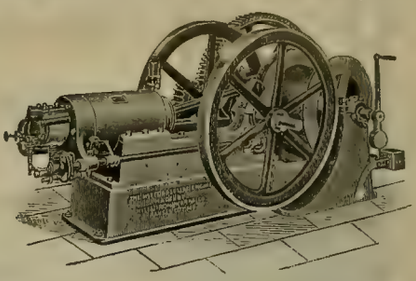
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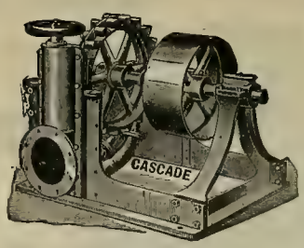
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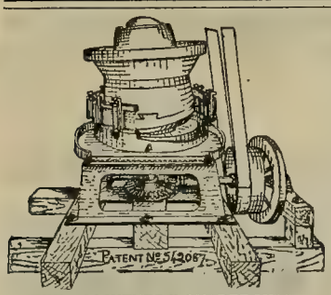
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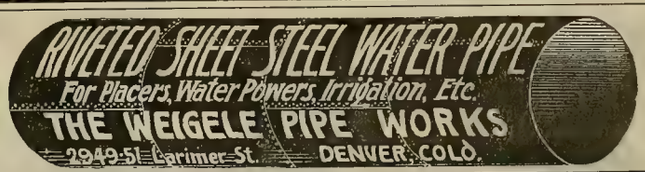
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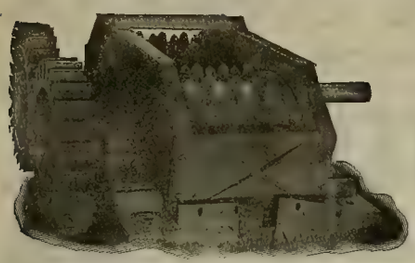
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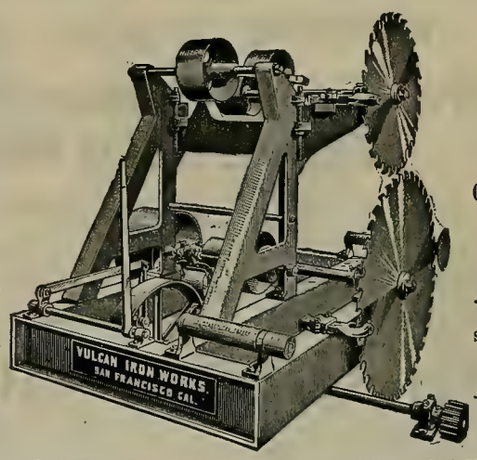
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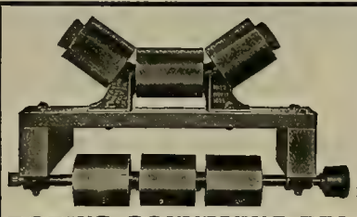


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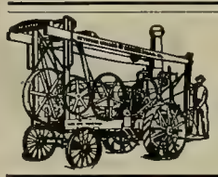
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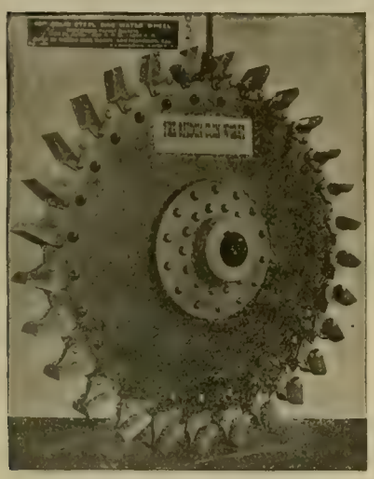
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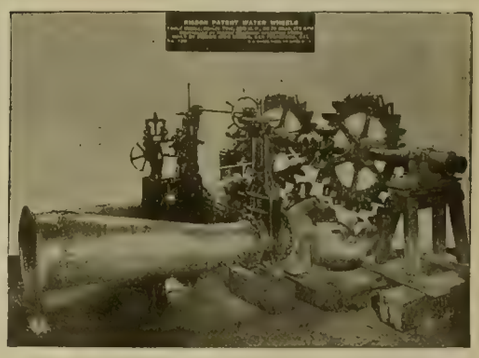
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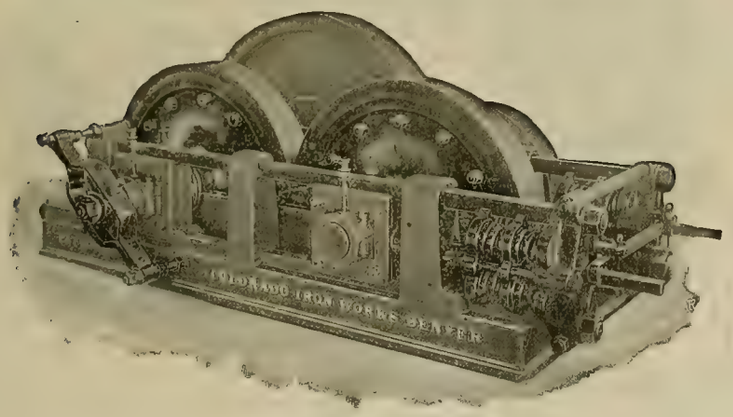


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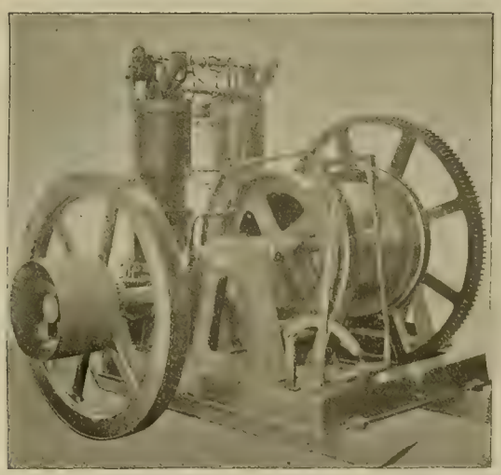
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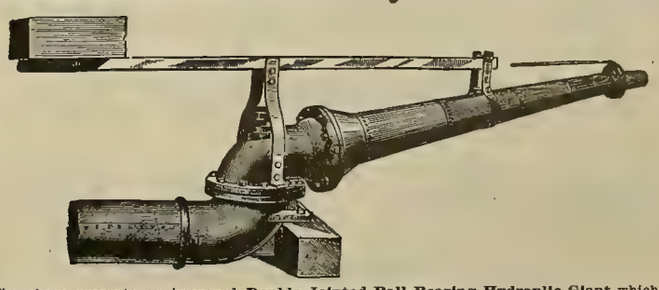
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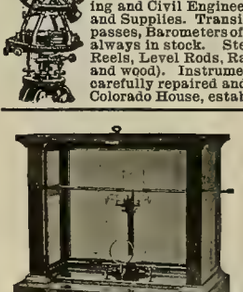
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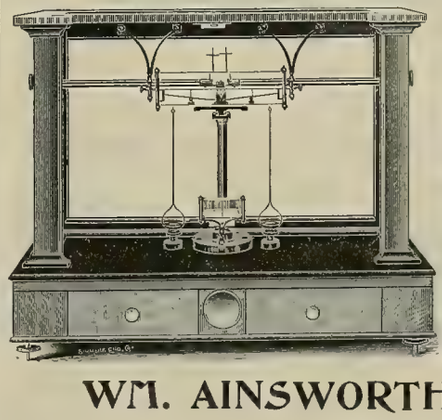
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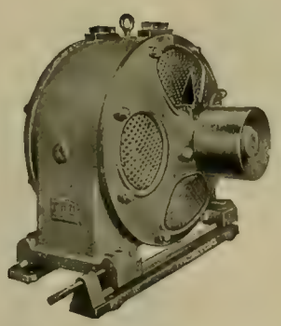
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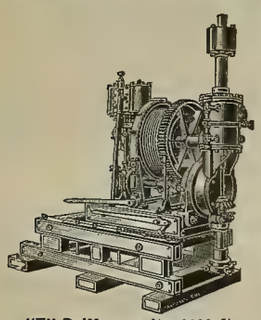
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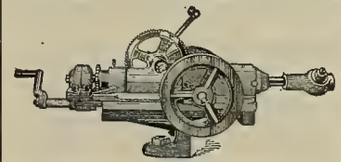
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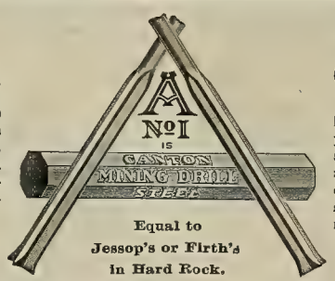
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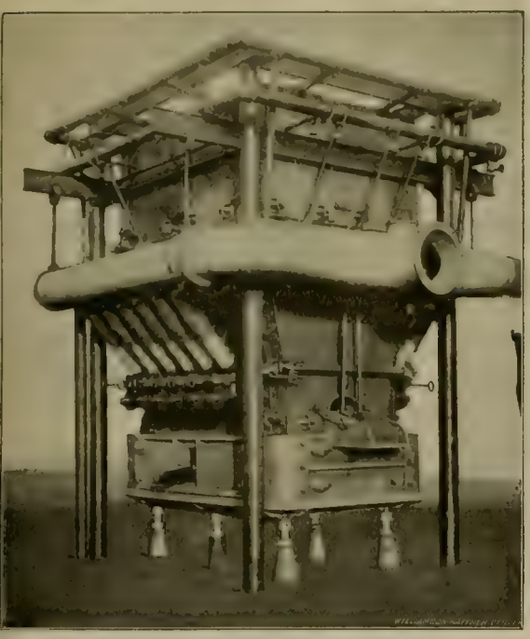
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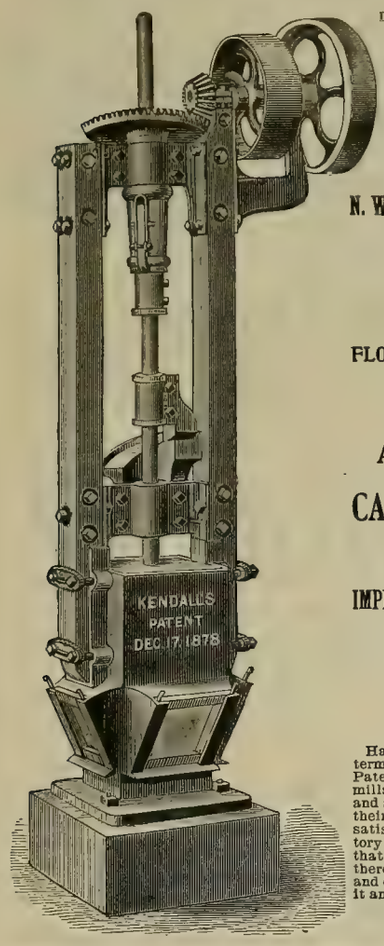
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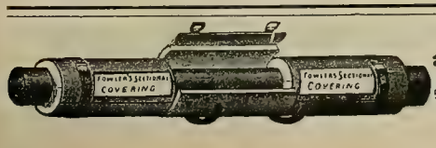
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Any stock upon which this assessment shall remain unpaid on the 12th day of March, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of April, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

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Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of February, 1900, an assessment (No. 118) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

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Office—Room No. 29, Nevada block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, 217 Sacramento street, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 22) levied on the 25th day of January, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
P. A. Wagner, Trustee	90	980	29 40
P. A. Wagner, Trustee	92	1,000	30 00
P. A. Wagner, Trustee	93	1,000	30 00

And in accordance with law, and an order of the Board of Directors, made on the 25th day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 19th day of March, 1900, at the hour of 2 o'clock P. M. of said day, to pay delinquent assessments thereon, together with costs of advertising and expenses of the sale.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

THE
Little Alaska Gold Washer.



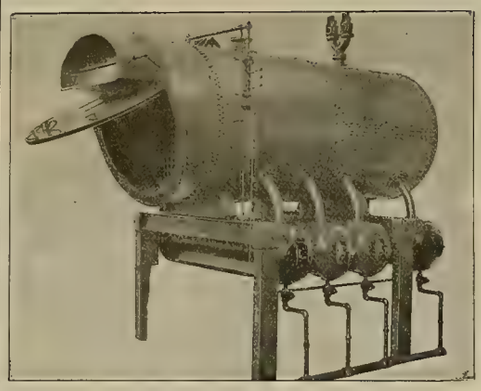
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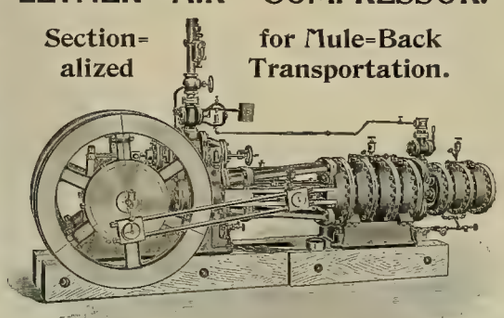


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RECORD BREAKERS.

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J. GEO. LEYNER,

OFFICE: 729 Seventeenth Street, WORKS: 36th and Wazee Streets,
DENVER, COLO.

DELINQUENT SALE NOTICE.

CALIFORNIA BORAX COMPANY. — Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

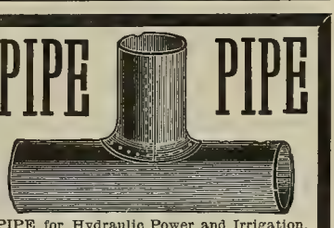
Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of January, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Geo. H. Bradford	14	85	$170 00
Isaac W. Bradford	48	3	6 00
Clark C. Bradford	40	13	26 00
Annie M. Bradford	41	10	20 00
Geo. H. Bradford	59	80	160 00
H. P. Cartier	67	5	10 00
Geo. H. Bradford	91	115	230 00
Geo. H. Folsom	101	20	40 00
Geo. H. Folsom	102	20	40 00
Geo. H. Folsom	103	20	40 00
Geo. H. Folsom	104	20	40 00
Luther J. Holton, Trustee	105	5	10 00
Luther J. Holton, Trustee	107	10	20 00
F. E. Densmore	108	25	50 00

And in accordance with law, and an order from the Board of Directors, made on the 26th day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, No. 310 Pine street, rooms 36 and 37, San Francisco, California, on MONDAY, the 2nd day of April, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

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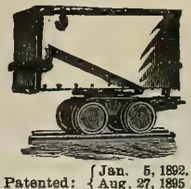
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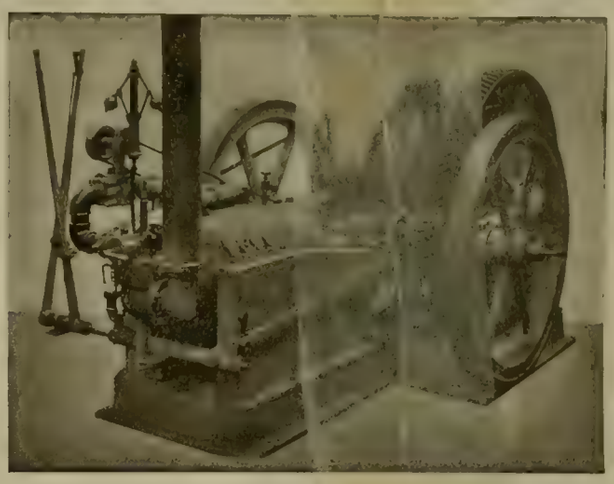
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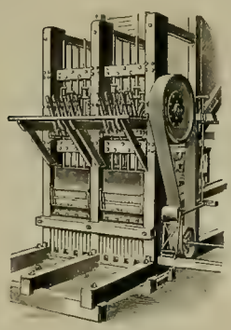
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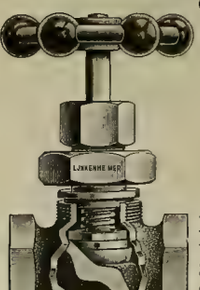
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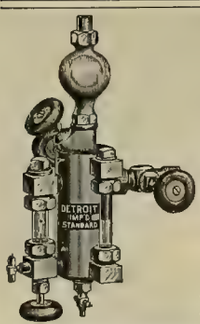
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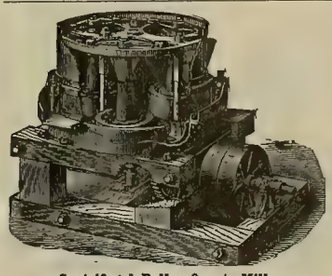
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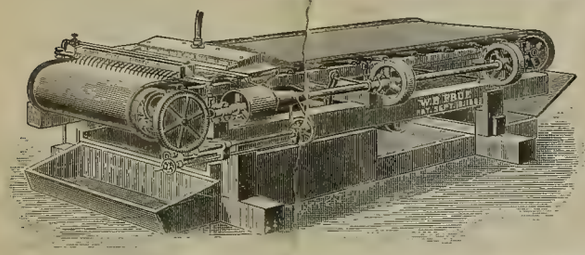
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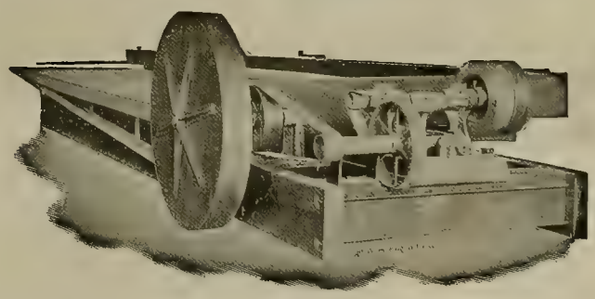
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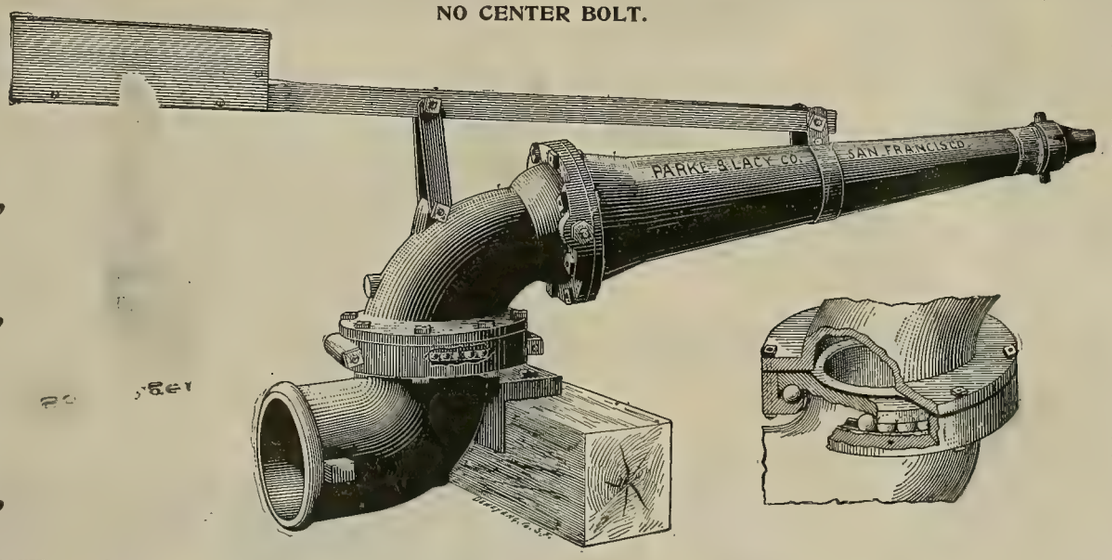
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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2071. — VOLUME LXXX. Number 11. SAN FRANCISCO, SATURDAY, MARCH 17, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Smuggler-Union, Colorado.

Prior to the advent of the Tomboy mine, the Smuggler–Union was the great mining property of San Miguel county, Colo., and for many years the fame of Telluride rested upon its output. The great Smuggler vein has been noted for twenty years, and since 1883 the property has been in continuous and profitable operation, contributing an annual average of half a million dollars to the amount distributed among the wage earners of the thrifty little town of Telluride. Through the years the owners of the property showed their faith in its permanence by buying or absorbing the adjacent claims and locations, and in 1891 the present Smuggler-Union Company was organized. In April, 1899, a controlling interest passed into the hands of the New England Exploration Company, a Boston corporation, that is a large owner in the Calumet & Hecla, the purchase price being on a basis of $3,000,000. The new owners have spent considerable money, and have built a mill at Pandora, a view of which is given herewith, that, in structure and equipment, is deservedly referred to with pride by that entire section as among the finest establishments of its kind in the world. As an instance of its quality, it may be stated that the foundation walls, alone, cost $30,000; the mill represents an outlay of about $250,000. The capacity of the Smuggler–Pandora mills is 500 tons per day. A technical description of the mine, the mill, the character of the ore and manner of treatment has already been given; reference is here made to illustrate the progress of mining and scientific development, where in what was once considered inaccessible fastnesses of the Rocky mountains, the courage, skill and intelligence of the American miner—a fine combination of Western pluck and Eastern capital—has made possible the creative development of so fine a paying property, aiding in the support of a typical American mining community, this one mine, alone, furnishing steady employment to over 500 men. The Smuggler–Union is illustrative of what may be similarly developed all over the great State of Colorado, which last year produced gold to the amount of $33,000,000 and expects to increase that amount added to the permanent wealth of the world in 1900. The yield of the Smuggler–Union for 1897 was $540,806.85; for 1898, $577,943.21; for 1899, $604,328.91. Manager Collins says he considers the Smuggler–Union "the making of one of the biggest mines in the world," which illustrates the hopes of the company as to its output for 1900. To the enterprising Journal, of Telluride, we are indebted for the use of the handsome engraving that depicts the largest mineral producer of San Miguel county.



The Smuggler-Union Mills at Pandora, San Miguel County, Colorado.

To the right is the new mill, in '99 the finest in Colorado: to the left is the old mill. The white building in the center is the company's offices. Up the gulch, in the center of the picture, one mile in a direct line, is the old Bullion tunnel, the entrance to the main workings.

THE maximum output of gold, silver and copper has not been reached. The business yearly becomes more systematized because of the advent of branch railroads, the steady supply of needful articles, the progress in scientific mining and scientific metallurgy, decreased cost in price of living, improved and cheaper mining appliances, the placing of the business of mining in front of the gamble in it, and the constant attraction of men of energy and capital to a business that offers such profitable result.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Office, No. 330 Market Street, San Francisco, Cal.

ANNUAL SUBSCRIPTION:

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Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN.....Publisher.

San Francisco, March 17, 1900.

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THE present tendency of modern metallurgy is to pay greatest attention to the profitable treatment of low-grade ore that occurs in considerable quantity. Time was when only high-grade ore was considered worthy consideration; now, such ore is "able to take care of itself," and the large body of low-grade ore is looked upon as affording most probable likelihood of permanent profit in the working. No ore is now too low-grade to be successfully treated if it exist in sufficient quantity to justify the erection of works on a scale that would enable it to be treated in continuously large quantities. In this regard it is a noticeable fact that among the best mine dividend-payers are low-grade properties, some of whose ores yield a value of less than $2 per ton.

SOME time ago the New Zealand Government bought the cyanide patent rights of the Cassel Gold Extraction Co. for $50,000, and is charging users thereof in that colony 1½% royalty on their gold output. The Victoria Government now proposes to buy the same rights for that colony from the Australian Gold Recovery Co. for $100,000, recouping itself by a royalty charge of 2%. With two exceptions, the present royalty charged by the Gold Extraction Co. in the colony of Victoria is 5%. The Victoria Minister of Mines figures that in five years the impost of 2% will be abrogated and the use of the process be made free to all therein. In a paternal way those Governments try to encourage the mining industry. The South Australian Government allows a rebate of one-third the regular freight charges in the transportation of machinery for the use of new mines, and makes a similar reduction in freight charges on the first fifty tons of ore sent away from a new mine.

INTERNATIONAL POLITICS naturally affect so world-wide an industry as mining. Present war news from South Africa indicate increasing probability of wholesale destruction of mining machinery and appliances and the greatest possible amount of damage to the Witwatersrand mines as a necessary or inevitable war measure on the part of the Boers. Thus far, in limited way, work has gone on and little lasting damage has been inflicted, but the war now assumes a phase where the final stand at Pretoria is apparent, which, of course, involves the preliminary destruction of Johannesburg. It is also likely that the long threatened general European war may ensue, preparations therefor being manifest. These matters affect the American miner, resulting partly to his advantage, partly to his disadvantage. At present the disadvantages are in the front row. One of the most apparent is the cessation of foreign or Eastern investment in Western mining enterprises, a calling in of securities or insecurities, and a discontinuance of projected ventures. Such will not be an unmixed evil if it result in more vigorous domestic development. And the refluent tide of returning desire for a share of our mineral wealth will be all the greater.

Federal Aid for Mining Schools.

Senator Chauncey M. Depew, of New York, on the 9th ult. introduced in the U. S. Senate the following Senate bill No. 3109, to promote and encourage the mining, mineral and metallurgical sciences of the United States, which was read twice and referred to the Committee on Mines and Mining:

WHEREAS, the mining, mineral and metallurgical sciences and industries of the United States of America have not heretofore received the attention, encouragement and support from the National Government that their interests deserve and demand; and,

Whereas, the product of the mining and mineral industry of the country last year approached the enormous sum of nearly one billion dollars, contributing thereby greatly to the wealth and general support of the Government, rivaling that of its sister industry—agriculture; and,

Whereas, the general interests of agriculture are fostered, stimulated and encouraged by government aid, through the provisions of the Hatch and Morrill acts, to the extent of $40,000 annually to each State and Territory;

THEREFORE, it appears but proper and just that the general Government of the United States should endow and support in a similar manner the industries of the mining, mineral and metallurgical sciences of the country.

Therefore, be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with mining and metallurgy, and in order to promote scientific investigation, research and experiment respecting the methods of mining, mine ventilation, methods of ore treatment and the recovery of metallurgical products, and in order to promote the study of the petrology, geology and mineralogy of the several States and Territories of the Union, there shall be, and hereby is, annually appropriated out of any money in the treasury not otherwise appropriated and arising from the sales of public lands, said money to be paid as hereinafter provided, to each State and Territory, for the endowment and maintenance of the department of mining in the State or Territorial Schools or Colleges of Mines now established, or which may hereafter be established, the sum of fifteen thousand dollars for the year ending June thirtieth, Nineteen Hundred, and an annual increase of the amount of such appropriation thereafter for ten years by an additional sum of one thousand dollars over the preceding year, and the annual amount to be paid after the expiration of the said ten years to each State and Territory shall be twenty-five thousand dollars.

SEC. 2. That it shall be the object and duty of said Schools or Colleges of Mines receiving the benefit of said fund to conduct original research or verify experiments on the mineral bearing rocks or deposits of the various economical metals of the several States and Territories; to investigate the building stones, mineral fuels, clays and all mineral deposits of whatsoever nature that may exist in any of the States and Territories; to experiment on processes of mining, ventilation, milling and the effectiveness and economy of mining machinery, and the various processes of ore treatment and metallurgy; to give instruction in assaying, methods of analysis, metallurgy, mineralogy, petrology, geology and kindred sciences, which have a bearing on work necessary to an intelligent mining and metallurgical education.

It shall be the duty of the governing boards of the Schools of Mines, with the advice of the President or Director of said Schools of Mines to indicate and outline, from time to time, special lines of work to be carried on, as the nature of the mineral products of such State or Territory may suggest as being a fruitful field or line for profitable research.

SEC. 3. That in case any State or Territory should not have a regularly established School or College of Mines, it shall be the duty of the legislature of such State or Territory to select some technical School or University, wherein the provisions of this act may be carried out: Provided, That such State or Territory so choose through its legislature to avail itself of the provisions of this act.

SEC. 4. That the sums hereby appropriated to the States and Territories for the endowment and support of the department of mining in the State or Territorial Schools or Colleges of Mines, shall be annually paid on or before the thirty-first day of July of each year, the first payment being due on or before July 31st, 1900, by the Secretary of the Treasury, upon the warrant of the Secretary of the Interior, out of the Treasury of the United States, to the State or Territorial Treasurer, or to such other officer as shall be designated by the laws of such State or Territory to receive the same, who shall, upon the order of the Trustees of the State or Territorial School or College of Mines, immediately pay over said sum to the Treasurers of the respective Schools or Colleges of Mines or such other institutions entitled to receive the same, and such Treasurers shall be required to report to the Secretary of the Interior, on or before the first day of September of each year, a detailed statement of the amount so received and of its disbursement. The grants of moneys authorized by this act are made subject to Legislative assent of the several States and Territories to the purpose of said grants: Provided, That payment of such installments of the appropriation herein made as shall become due to any State or Territory before the adjournment of the regular session of its legislature meeting next after the passage of this act shall be made upon the assent of the Governor thereof, duly certified by the Secretary of the Treasury.

SEC. 5. That if any portion of the moneys received by the designated officer of the State or Territory for the endowment of the department of mines in any State or Territorial School or College of Mines, as provided in this act, shall, by any action or contingency, be diminished or lost, or misapplied, it shall be replaced by the State or Territory to which it belongs, and until so replaced no subsequent appropriation shall be apportioned or paid to such State or Territory; and no portion of said moneys shall be applied directly or indirectly, under any pretense whatever, to the purchase, erection, preservation or repair of any building or buildings: Provided, however, That a sum not exceeding twenty per centum of any annual appropriation received by any institution shall be available, if deemed necessary, to be applied in purchasing scientific instruments and apparatus and to be used in the construction, erection, equipment or building of special apparatus and machines or plants, designed to successfully carry out the methods in scientific research as embodied in this act.

SEC. 6. That a full annual detailed report of all operations conducted during the past year ending the thirtieth day of June of each year shall be made out by the President or Director of each School or College of Mines, by November the first of each year, and transmitted to the Governor of the State or Territory in which said school belongs, and a printed copy of said report shall be sent to each School or College of Mines of the several States and Territories and to the Secretary of the Interior. Said report shall embody a lucid statement of all experiments and work of a practical and scientific nature conducted during the past year, embracing everything which may be considered of special value to the mining and metallurgical industries, including a statement of all receipts and disbursements necessarily arising in carrying out the provisions and intent of this act; Also, the condition and progress of each school, including general information as to the number of its professors, number of its students, its library and general equipment.

SEC. 7. That bulletins or supplementary reports shall be published by said Schools at any time when deemed of general importance to the mining community or to the interests of any particular mining industry or mining district. Such bulletins or reports and the annual reports of the several Schools of Mines shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the Postmaster General may from time to time prescribe.

SEC. 8. That whenever it shall appear to the Secretary of the Treasury from the annual statement of receipts and expenditures of any of said Schools of Mines that a portion of the preceding annual appropriation remains unexpended, such amount shall be deducted from the next succeeding annual appropriation to such school, in order that the amount of money appropriated to any school shall not exceed the amount actually and necessarily required for the support of the mining department of said institution.

SEC. 9. That on or before the first day of July in each year after the passage of this act, the Secretary of the Interior shall ascertain and certify to the Secretary of the Treasury as to each State and Territory whether it is entitled to receive its share of the annual appropriation for the department of mining in its School or College of Mines, under this act, and the amount which thereupon each is entitled, respectively, to receive. If the Secretary of the Interior shall withhold a certificate from any State or Territory of its appropriation the reasons therefor shall be reported to the President, and the amount involved shall be kept separate in the Treasury until the close of the next Congress, in order that the State or Territory may, if it should so desire, appeal to Congress from the determination of the Secretary of the Interior. If the next Congress shall not direct such sum to be paid it shall be covered into the Treasury. The Secretary of the Interior is hereby charged with the proper administration of this law.

SEC. 10. That the Secretary of the Interior shall annually report to Congress the disbursements which have been made in all the States and Territories, and also whether the appropriation of any State or Territory has been withheld, and if so, the reasons therefor.

SEC. 11. That nothing in this act shall be construed to impair or modify the legal relation existing between any of the said Schools or Colleges of Mines of the several States and Territories, and the government of the States or Territories in which they are respectively located.

SEC. 12. That nothing in this act shall be held or construed as binding the United States to continue any payments from the Treasury to any or all the States or Territories or institutions mentioned in this act, but Congress may at any time amend, suspend or repeal any or all the provisions of this act.

Concentrates.

IRIDESCENT GLASS is made by exposing the melted glass to the vapors of salts of sodium.

PETROLEUM weighs six and one-half pounds per U. S. gallon - forty-two gallons to the barrel.

IN a dispute as to relocation of a mining property the burden of proof is on the claim jumper.

BY free air is meant air at atmospheric pressure, about fifteen pounds per square inch at sea level.

THE honest sale of any mining stock should be deferred till perfect title to the property is assured.

BEFORE coating mine timbers with any preservative the wood should be barked and well dried.

SPHENE is a silicate of lime and titanium, for which there is no industrial demand so far as known.

PURE carbonic oxide has no smell: its presence is known by a white vapory mist, called by miners "white damp."

IT is customary or usual with county assessors to assess an undeveloped mining claim at $100 valuation for taxation purposes.

WHERE acidulated mine water ruins the water end of a steam pump, gun metal or some similar composition may be used with advantage.

THIRTY-FOOT steel rails at eighty pounds to the yard weigh 800 pounds. Twelve miles single-track railroad would take 1800 tons of such rails.

A GOOD example of double-riveted 30-inch wrought iron pipe is afforded in the 22-mile line from Alvarado to Oakland, Cal., built about five years ago.

THE Malay State Miners' Association has asked the Government to reduce the royalty on lode tin from 14%, the present rate, to 8% on the gross output.

THE official survey of a mining claim must be in accordance with the recorded notice of location as of record at the time of the order authorizing the survey.

TO ANY ONE having opportunity to dispose of unprofitable mining stock it may be said: "Sell what you have, if you wouldn't buy it if you didn't own it."

SYNTHETIC chemistry is creative: its principal field is the production of substances in rivalry (or co-operation) with nature. Analytical chemistry takes things apart.

IN an arc lamp, supplied with a direct current, the consumption of the positive carbon is in round numbers 1 inch per hour, and of the negative carbon one-half that amount.

"A TON OF GOLD," Troy weight, is worth $496,123.20; avoirdupois, $602,921.93. Should the inquirer contemplate such purchase he should insist on the seller supplying it on the latter basis.

THE Con. Cal. & Va. gold and silver mine in Nevada has declared dividends aggregating $78,029,000; the Calumet & Hecla copper mine, Michigan, has a record of $67,850,000 dividend disbursements.

WHERE the air cylinder of a compressor is 12 inches in diameter, stroke 18 inches, when running at 120 revolutions per minute, it will furnish 56.5 cubic feet of compressed air at sixty pounds on gauge.

THE Osceola copper mine, Opeechee, Mich., is worked in an amygdaloid vein, an altered trap rock, the copper varying in size from fine grains to large masses. The amygdaloid is from 3 to 40 feet in width.

THERE are 371.25 grains pure silver in an American silver dollar. To every $2000 silver coined in the U. S. Mint is added one pound of copper. There are 23.32 grains pure gold in an American gold dollar.

THERE are several salt works in successful operation on the Pacific coast, one at Alameda, Cal., another in San Diego Co., Cal. The Inland Salt Co., Salt Lake City, Utah, operates a rock salt drying plant.

SATURATED STEAM, pressure above zero, 100 pounds to the square inch, a temperature of 327.57° Fahr., latent heat 882.91 B. T. U., total heat above zero 1213.84° Fahr., B. T. U., weight per cubic foot would be 0.233 pound.

THERE are several good mining schools, notably in California, Colorado, Michigan, Pennsylvania and New York. Those in California and New York are connected with and form a distinct part of a university course.

THERE are numerous devices for ventilating mine shafts, some of them simple and cheap, others more complicated and expensive. Write to the M. C. Bullock Co., Chicago, for their catalogue No. 35 on mine ventilation.

THE deepest hole, so far as "Concentrates" knows, bored in the earth's surface is at Paruschowitz, upper Siberia, which at last accounts had reached a depth of 6783 feet, the temperature increasing to 10° C. for every 111 feet.

IT is seldom that there is room for two superintendents in one mine, and the better plan in the case specified is to have a frank and friendly adjustment of all internal difficulty before increased expenses or personal collision creates serious trouble.

THE horse power of a water supply may be approximately determined: multiply number of gallons per minute by pressure in pounds per square inch, and divide product by 1500. "Pressure in pounds per square inch" is found by multiplying number of feet fall by .433.

BY reason of improved methods, better transportation and general advance in the mining and scientific world, $100 will do as much in mining work to-day as $400 would thirty years ago. But the gold product brings as much to-day as it did then. Gold mining is the one business on earth of which this can truthfully be said.

AN important feature in boiler practise is carrying the water at such a height in the boiler as to prevent explosions by the exposure of the tubes to the fire, and, at the same time, leaving as large a space as possible, insuring dry steam to the engine, thus deriving from the boiler the most effective duty possible.

TO FIND the horse power necessary to elevate water to a given height, multiply the weight of the water elevated per minute by the height in feet and divide the product by 33,000 (an allowance should be made for water friction and a further allowance for losses in the steam cylinder, say from 20% to 30%.)

BEFORE blaming the assayer be sure of your samples. It is also well to be sure that you are paying for good assay work. A good assayer can not afford to do cheap work, and, in this as in other lines, skill, accuracy and knowledge must have adequate recompense. A man mustn't expect a $2 assay for 50 cents.

THE Eisenzecher-Zug mine, near Siegen, Germany, has yielded continuously since 1495. The Rio Tinto mine, Spain, is credited with production for nearly 2000 years. There are gold mines in California that have given continuous product for fifty years. How many other businesses can show so permanent a record?

IN all quick-acting electro-magnets, and in magnets for alternating currents, the core should be laminated, to prevent eddy currents. Sometimes, however, when the alternations or pulsations are not very rapid, the eddy currents are prevented, by making the core tubular and slitting it through lengthwise on one side.

THE following are the barometric pressures at different altitudes: Pressure at one-quarter mile above sea level, 14.02 pounds per square inch; one-half mile, 13.33 pounds; three-fourths mile, 12.66 pounds; one mile, 12.02 pounds; one and one-quarter miles, 11.42 pounds; one and one-half miles, 10.88 pounds; two miles, 9.88 pounds.

TO FIND the diameter of pump plungers to pump a given quantity of water at 100 feet piston speed per minute, divide the number of gallons by 4, then extract the square root and the result will be the diameter in inches of the plungers. This is for single double-acting pumps; for duplex double-acting pumps, divide by 8 before extracting the square root.

SAN FRANCISCO men bought the "Lost Confidence" mine in Shasta Co., Cal., in July, '86, for $125,000—$50,000 cash, the rest payable from the mine's net earnings. They built a 20-stamp mill, spent $100,000 and quit. In '94 the Mountain Mines Co., Ltd., of London bought the property for $300,000, has spent about $1,000,000 and is producing matte copper at an estimated annual profit of $500,000.

THE American Smelting & Refining Co. is a consolidation of fourteen smelting and refining concerns. Its first fiscal year ends on the 1st prox. The capital of the company is $65,000,000, one half 7% cumulative preferred and one-half common; it has paid 7% on the preferred stock during the year. The company has a working capital of about $7,000,000 and proposes to bring this amount to $10,000,000.

INFALLIBILITY is an attribute humbly disavowed by any paragraph published herein; the sole idea being honest effort to give information regarding questions asked, and any manifest error in such is always gladly corrected upon being pointed out. "Concentrates" is fully aware of the constant possibility of mistakes in statements made herein and constantly invites criticism or correction.

THE holder or locator of a mining claim can not legally continue in possession of it just by making an application for a patent and then neglect or refuse to perfect title by making final entry and paying the Government price. He must use due diligence in going on with the rest of the Government requirements after he has made application for patent, a reasonable amount of time being, of course, accorded him.

ROCK FILLING, tightly packed in, is more durable and stronger than timbers. Where it abuts on an open space intended to be maintained as a permanent opening, the filling should be faced with a rough walling built up of the larger pieces, the smaller being thrown back of this. Such waste for filling obtained from dead work in the mine can be used on the level where made or on the one immediately below it.

THIS paper has no sympathy with the man or men who try to hold a number of unpatented mining claims year after year without doing the requisite amount of annual assessment work thereon, but who ask an impossible or prohibitory price from any one proposing to take hold, in a tangible way, of any one of them. Trying to hold everything in sight in that way hurts the man himself and that entire section.

APPROXIMATE determinations of the reduced efficiency of air compressors are made by deducting the percentage of difference between the barometric pressures at the respective altitudes. The volume at sea level being 1, that at one-quarter mile above sea level will be 7% less; one-half mile, 11% less; three-fourths mile, 16% less; one mile, 20% less; one and one-quarter miles, 24% less; one and one-half miles, 28% less; two miles, 34% less.

COPPER OXIDE or cupric oxide is a by-product in considerable quantity where copper-iron pyrites are burned for the manufacture of sulphuric acid. It is readily manufactured direct by exposing scraps of thin sheet copper in a reverberatory furnace for eight hours; if the resultant be ground and reburned comparatively pure cupric oxide will be produced. It is of great industrial value in refining petroleum that may contain hydrogen sulphide gas.

WHILE it is essential that there must be manifest merit in any proposed "mining invention," it is to be admitted that the securing of favorable publicity in the proper quarter has much to do with bringing the device into immediate demand. But no amount of "booming" will keep any kind of mining apparatus in permanent favor unless it has inherent merit that will commend itself to the favorable consideration of the practical miner.

IN bonding a mining property great care is necessary that the contract or agreement be in writing, and be clear and explicit, not only that its provisions can be understood, but that the meaning of every word can not be misunderstood. Good faith is to be presumed on both sides, but a cunningly worded bond can tie up a mine and its owner. A form of bond fair to both sides should be used and the whole thing gone over fully before signing. Once signed, it is little use to play baby or claim ignorance of the contents of a contract.

IT is for any prospective user of power to determine whether water, steam, electricity or compressed air can best and more economically serve his purpose, and this can only be determined by accurate knowledge of the circumstances in connection with each individual case. Local surroundings, conditions and requirements differ so greatly that each one must be considered by itself, and none but the most general of rules can apply. In the case specified our advice would be to consult a competent mining engineer and take his advice.

THE California mineral land bill is before Congress this winter, and deserves favorable consideration, for it is a worthy and necessary measure and should be promptly passed upon its merits, but the fact that Stewart of Nevada is still Senator therefrom and still doing business at the old stand militates against its progress. Public opinion has retired other Senators and Congressmen who opposed it, but corporate influence successfully retains one or two useful servants in both houses, of whom the U. S. Senator from Nevada is the most conspicuous.

A MINER'S COMPASS consists of a magnetic needle, with counterpoise, suspended on a horizontal axis, so that it is free to revolve in a vertical plane. The needle is ordinarily enclosed in a circular case with glass sides. Degrees are marked on an inner circle, beginning with 0° at each side, and graded down to 90° at the bottom. The needle being properly counterpoised, if the north end be drawn downward the attraction is positive so many degrees: if the south end is drawn downward, the attraction is negative, say 20°. It is used in prospecting for magnetic iron ore.

THE editorial statement was made in last week's issue that ore going less than $2 per ton was mined at a profit. Being asked "Where?" Concentrates calls to mind several instances: at the Atlantic mine, Houghton, Mich., where the $2 ore is mined, carried, put through a stamp mill, concentrated, smelted, at a total cost of $1.10 per ton; at the Deadwood-Terra mine, South Dakota, where a 160-stamp mill has crushed 15,000 tons per month of ore averaging $1.80 per ton, at a total cost for mining and milling of $1.40 per ton. Other instances are quotable in California and elsewhere.

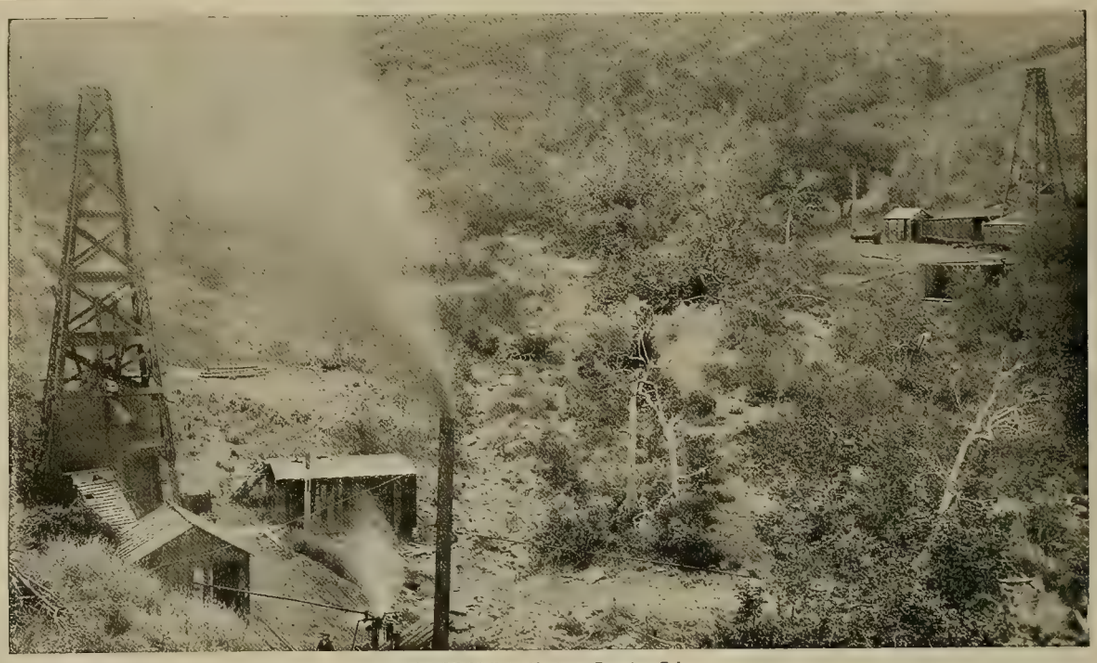
IT were, indeed, better, as claimed, if mining stock could be non-assessable. Outside of California it is—nominally. But however ideally correct such plan may be, it is the common practical experience that it is only by the assessment plan that non-paying properties owned by a corporate company can be successfully or continuously operated. If money is needed to go on and it can not be got out of the mine itself the only way is to levy an assessment. It can be called "voluntary contribution" or "pro rata contribution" or anything else—but it is an assessment just the same. When some of the owners of a property tire of paying out money for development work and decline to further contribute, in the absence of State statutes regarding assessment work, nothing can be done, so far as they are concerned.

TO KEEP ice out of a hoisting shaft, if a three-compartment, board up, with corrugated or galvanized iron, both hoisting and pump compartments to the top of the pulley wheel frame, place doors at the lower landing or top of shaft in all three compartments, open the one intended for downcast and shut the one designed for upcast, place the steam jet or pump exhaust in the upcast side. The heat of the steam will warm the upcast side and create a vacuum or motive column and the necessary ventilation and melt the ice. If the downcast side becomes frozen again, which will be sure to follow in cold weather, all that is necessary is to reverse the air column in the shaft by opening the door you want for the downcast and shut the door for the upcast, as above. It is not required to cover the top of either of the compartments. The pump and suction pipe must be in the return air-way, and the water column pipe as well as the exhaust and steam pipes must have drain cocks or small gaspipe with valve attached in order to drain the pipes thoroughly when the pump or jet stops working. Connections must be made in such a way at the pump exhaust and steam jet that they can be used in either of the shaft compartments.

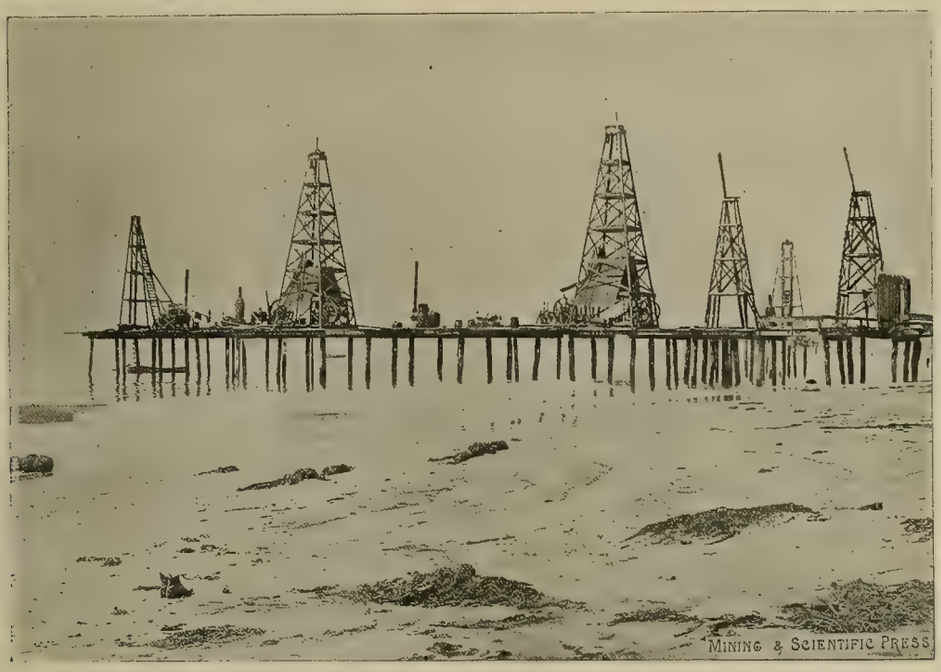
The California Oil Industry.

Written for the MINING AND SCIENTIFIC PRESS by ERNEST HORSFALL RYDALL.

The air in California, as well as the ground, is full of oil. It is on the street, in the bank, in the office—everywhere; officials at the Los Angeles city hall and courthouse are establishing local companies restricted only to employes in their respective establishments; clairvoyants are in league with oil companies to influence believing women that stocks in that or the other company are bound to rise; the consequence: oil companies, in luxurious offices, are in every block in Los Angeles, often the same men under different names operating the various investments. Valuable space in the local papers is daily filled with lurid descriptions of the fortunes that await investors in shares of oil stock, and, indeed, remote must be the district and illiterate the domestic to whom the dazzling pictures of fortunes in oil investment are not as familiar as a twice-told tale. An oil exchange has been formed in Los Angeles, occupying a store room on the principal street, where for an hour a day the interested meet and advance or depress oil shares. Hundreds of derricks are being established beyond the original oil limits, and



An Oil Well in Ventura County, Cal.



Submarine Oil Wells at Summerland, Santa Barbara County, Cal.



Pumping Petroleum From Under the Sea, on the Sea Beach, Santa Barbara, Cal.

day and night the pumps are unceasingly pumping oil. For rugged, precipitous hills, that a few months ago were worth only a few hundred dollars certified checks for a hundred thousand are now refused; property is easily leased at fabulous prices, and many a man who a few months ago had joined the vast army of the financially embarrassed, that will ever afflict this favored section, is now beyond the dreams of avarice and knows his old-time companions no more.

This condition is not confined to Los Angeles; from San Diego come reports of increasing oil findings; near Del Mar is believed to exist extensive oil deposits. Right on the bluffs, fronting that staid Pacific that three centuries ago to the amazement of a lot of savages carried the Spanish galleons of Cabrillo, now stands the serried oil derricks. The Puente district has for eleven years been producing oil; the output is increasing in the Coalinga valley; the district is enlarging to Fullerton, and even up to the barren desert of the Mojave, in the Sierra Madre mountains, come reports of new oil fields, resembling the Pennsylvania excitement of years ago. Los Angeles, Ventura, Kern, Orange and Monterey counties are all producing oil, and it will not require a very lively or enthusiastic imagination to picture in this remote corner of the continent, between the desert of Arizona and rugged mountains and the placid, silent Pacific, another vast oil field yielding millions of tons of oil for consumption as fuel and furnishing employment to a community who have been attracted here by laudatory advertising or their own health needs to linger through a precarious and uncertain existence in the land of the olive and the vine.

Six years ago an enterprising individual bored an oil well in Los Angeles; since that time 700 wells, each costing $2000, have been sunk. While some of these have become exhausted, a great many are still running, and new wells are being dug at the rapid rate of at least 100 a month. A procession of tanks is ever on the move from the oil districts to the various city manufactories; electric light machinery works and railway shops carry this valuable fuel, 3½ barrels of which is equal to one ton of soft coal. The base is of the California asphaltum, instead of paraffine, as are the Pennsylvania oils, making it, therefore, not suited for illumination; its average gravity is about 15°; it is a thick, black oil, and one of the best fuels yet discovered. Its by-products enter into the lubricating oil, the painters, printers and other trades, and the asphaltum, after the oil has been extracted, can be used for street paving; indeed, the ancient Mexican who inhabited these regions a hundred years ago used it for roofing. The most classic and beautiful residence district of Los Angeles has been invaded by this industry; where dwelt the city Crœsus now exist lofty derricks, disfiguring the landscape, and now can be heard the creak of the pumping machinery, the swish of the steam and noises of all descriptions that disturb the silent watches of the night. A thousand dollars a day for a 50 or 100-foot lot, however, somewhat compensates the capitalist, who is compelled to wander to another aristocratic district to find suitable surroundings for his luxurious and refined family. This invasion of the residence district by the oil speculators, divided as it is into little lots, has resulted in wells being sunk within 50 feet of each other, and thus each anxious owner, pumping for a while the supply in the vicinity of so many wells in so small a space, has exhausted the output in the vicinity and returned the lots to their original comparatively insignificant value. Such an absurd juxtaposition of oil

lots was never before neard of; yet, a farther depth may result in more oil being produced, and wells may be revived after a period of exhaustion.

There is no surety as to the cost of sinking an oil well: a safe average may be stated at $2000. Going through soft sandstone, the borer has a comparatively easy task, unless he drop a tool or break his tubing, when the cost may be much increased. At first the product sold for $2 per barrel of forty-two gallons, but went down to 35 cents, at which period the railroad companies altered their engines to burn oil, for oil at that figure resulted in vast economy to them. After the engines were changed to burn oil up went the price, so that coal after all proved in some cases the cheaper fuel. The price is not likely to go over $1.25, and may, in consequence of the recent discoveries of new fields of almost unlimited extent, go down to a nominal figure again. Large storage tanks are built in Los Angeles, containing upwards of 500,000 barrels of oil. The average daily production in Los Angeles is about 5000 barrels; nearly $2,000,000 per annum, therefore, is flowing into Los Angeles county to-day from the sale of oil alone, and about an eighth of that is paid to the workers at the pumps and the haulers of the portable tanks. A vast force is engaged in the manufacture of machinery for the oil wells, and, in quoting these statistics in reference to the widespread benefit of the oil industry, some odd thousand street oil brokers and dealers in oil company shares must not be forgotten, for these people subsist, temporarily at least, upon the indirect oil output. One of the most interesting oil fields is that of Summerland, in Santa Barbara county, where wells have been dug out in the ocean below high tide, and wharves are run out from the shore upon which the pumping machinery is placed.

When we consider the fact that the export oil trade of the United States is decreasing; that the total shipments of 1898 were 30,000,000 barrels less than those of 1897, the discoveries of new oil fields and the attending excitement in California will be gratifying. It opens a prospect for the Asiatic trade that this country will undoubtedly take advantage of; the Russian and Bornean oil will have a competitor in California; freights to the Orient from San Francisco will be considerably less than from Philadelphia; indeed, there is sufficient in sight to induce an everyday, ordinary capitalist to look into the matter, and to do so as quickly as possible before the Standard Oil Company, with its eagle eyes and Argus hands, shall reach out and embrace the famed oil fields of southern California.

A Defense of the Divining Rod.

No one outside the incurable ward of an insane asylum should give a moment's serious consideration to a "divining rod" or "dousing stick" or other similar device in the hands of any one purporting ability to indicate the presence of mineral in the ground.—MINING AND SCIENTIFIC PRESS.

TO THE EDITOR:—Referring to the above, it can be said that a defense of the divining rod as a means of finding ore veins may draw upon my devoted head a shower of abuse or denial. Nevertheless I sail in and plant the standard.

Prospectors travel carefully over a country, examining river bottoms and mountain ranges, knocking off pieces of rock, applying the glass to see whether they contain mineral, and in time, if the country is clear, they will find nearly every ore vein apparent on the surface. But where the largest and richest veins are covered there is no possibility of finding anything to guide him, and the prospector has to abandon that field as "no good." His compass is no use unless he has the bearing of a ledge coming from some outside place; he is in the dark and can do nothing because the very bearing he brings with him may assume a new curvature.

The man with the divining rod steps in and can point out where the veins are to be found; not by chance or guesswork, but by an inherent law of science or nature which can be demonstrated as easily as the law of telegraphy. The rod is not a mere toy to be laughed and sneered at, or even trifled with, for in the hands of a man who intelligently understands its use or power it is a sure and certain indicator of veins or ledges.

A deep shaft may have a complex or erratic vein and the ore body may be lost, and this may have taken place so gradually that it is pronounced a "pinch out," or the ore body may have disappeared and the gangue has been filled with base wandering stuff. It may be a fault, throwing the ore up or down, or it may have thrown the ore body into a parallel vein 40 or 50 feet on either side. The management would probably follow the trend of the vein, expecting to overtake the elusive ore; then he would crosscut on either side; in crosscutting he might start on the wrong side and get tired finding nothing; then makes a faint attempt on the other side and quits work ere the ledge with the ore in it is found, and the mine is abandoned.

The undeviating law which the man with the rod is impelled to work by is as potent in the deepest mine as it is on the surface, and he can direct where to find the lost vein.

In placer and blanket deposits the divining rod can not be employed, as the rod has no affinity with loose or wandering deposits. In coal fields the rod is less efficacious than in metalliferous mines. The dykes which ramify a coal field are a source of expense and inconvenience, especially if conducted on the long wall principle. The divining rod can follow the line of every dyke in the field and show where they intersect each other, thus giving the operator timely notice and saving his output from sudden shrinkage.

I would observe in passing that Mr. Fox, of Cornwall fame, experimented with the electrical currents in the veins of mines long before wireless telegraphy was thought of, and telegraphing through a mountain is not new. And yet the same law is subordinated to the man using the divining rod. The great currents which run from circumference to center of the earth's crust are careering through the veins, fissures and dykes. It cannot yet be ascertained whether the currents are going into the earth or the reverse, but it is a moving, vital energy and represents a volume of force feeling much like the shock of a battery returning after an unsuccessful attempt to put off a blast. The question remains unanswered to-day, What is electricity? The mysterious question might be asked, What is the divining rod? I frankly confess I do not know, but I will tell you how it acts and feels in the hands of a magician who is learned in its many uses.

If one comes across a vein of some magnitude, strong with powerful and distant surface attraction, and will reach down and down far into the crust of the earth, this vein will so transfix the rod man by the full force of the strong current that he may have to drop the rod so as not to receive the full force of the current into his body. A vein of this quality can be felt 30 feet on each side of the center. As three veins generally run pretty close together, the strongest can be selected for operation—that is, the one carrying the greatest volume of electricity. Some one will turn his attention to the discovery of an instrument to measure the strength of the currents much in the same way that is now done in electrical science, and the prospector will have a "current indicator" instead of the old divining rod.

There are veins and veins—some so feeble that the experienced rod man is at a loss to know how nature has spent so much time for so little, because the uninitiated may rest assured that a vein with a weak current is one of nature's misfits. There are many mines that have a good showing, and that was all the ledge ever had. The application of the rod by mining engineers would save many a mining venture from turning out unprofitable were this science more relied on than trusting to guesswork. About the electrical currents, there stands the open door for every man to satisfy himself. He may follow a natural law and continue on. An experienced man can trace a vein on the surface with about as much sagacity as a pointer dog the game. The rod is used frequently to indicate the vein line, and you do not get away from its influence. When you have got to a place where an opening would be convenient to make, you come as near the center of the vein as you can by trying the weight of influence on each side and reaching the center by successful trial. This is proved by stepping on each side until the attraction entirely ceases, then counting your steps into the center, and repeating this operation on the other side in the same way. You will find that the three points will make a central one, and you may sink your shaft or open your prospect hole with the utmost confidence of finding a vein, though it may be covered by 20 feet of surface. In following a vein great care must be taken lest one gets on a new trail, as outside veins, and sometimes shoots from the vein you are following, will create a divergence, and it is a good plan to keep your compass to note the bending of the vein you are running, and when any vein leaves or joins. It is a well-known fact that very many great veins of ore do not come through the surface, and many continuous veins are lost from very trifling causes.

I was in the Atlin country last year and found the rules which I have laid down here perfectly reliable in the snow so long as the feet touched the ground. All men who know anything about mining know that a creek is a good place to look for an ore vein, usually in the line of the running water, and yet I have been perched on a log crossing a waterfall and applied the rod and found that a vein was under me, and had no difficulty in finding it, the ends of the log which I was standing on acting as a conductor to my body. Wherever great veins have been lost in the mountain ranges they can be followed up in the snow as easily as on the bare ground. It has been known that a whole mining camp took water from a valuable ledge for two years, and had no idea of its existence until it was pointed out that there was a strong vein at that point.

I have traveled through the gold fields of Ballarat in Australia and in New Zealand, west coast of Mexico, Central America and California, and have never found the rod to fail. In going along what is called the mother lode of California there is no single vein from Jamestown, Jackson, Sutter Creek or Angels to Amador that will not bear that construction. It is a mineral belt or zone and may be described as a series of veins running in somewhat parallel lines, but moved slightly by cross veins, leaving the main ledges and pursuing courses at intervals from either side. Many of these cross veins have not been worked. They are sometimes very rich. There are other veins between the main parallel ledges which never leave the belt and form a doubling. They are massive, and it takes nice discrimination to say whether they are one or two. The divining rod which points out the veins of the earth does not say whether they will be rich or the reverse.

In going along the mineral belt between Quartz Mountain and Amador, California, where so much underground work has been done, and where the veins can be traced with accuracy, the moment your foot touches a vein that has been tampered with or mined underneath the divining rod ceases to act and is utterly useless. Therefore you can tell the extent of mining operations from the beginning to the utmost extension of the workings You observe that the connection between the divining rod and the vein is cut, and to obtain a connection of the same vein you must go down the shaft and set your foot on the solid ledge.

There is quite an array of talent, learned and otherwise, in the complex science of petrography attempting to give a scientific description of some country rocks and genesis of veins, and when it is a mixed proposition it has to have a multo-coinage. I admit that geology is a tentative science and that we are but groping our way. The miner has no finger-post set up to guide him; it is the miner that guides the geologist; their reports are loaded with ingenious guesses as to how values come into veins and pockets as ore bodies; that hot water was the agency by which this was effected, not thinking or overlooking that there is a law of nature going on in full blast to-day. The gases which are coming up from great depths is a more subtle agency than water, and, passing the electrical currents, eliminate their values and they fall in imperceptible vapor as it rises to the surface. All practical miners know that every ledge has a core. The core may be in the center or on either wall, where the highest values are to be found, and by applying the divining rod it will indicate that very place as the center of the vein, or where it is situated. What I am advancing here can easily be verified, and it opens up a new field for the progressive miner. He sees now that the values are deposited by a twin agency, the deep gases and the electrical currents.

It will be obvious to everyone that the intelligent man with the rod works in line with the greatest discoverers of the age. We might advance another step and ask, Where is the home of electricity? It seems to be always present and is subservient to man's use when the conditions are observed which are necessary to bring this giant into use. Is it in the elements of nature where we see the bright flashes and hear the thunder roll? We think it is not there. Then it must be in the earth, and we find this idea sopported by our own experience and by every electric wire which is set up having to be grounded to complete the circuit. Electricity is found in every vein, fissure, ledge, dyke and underground watercourse of the earth; there is no limit to depth or height. We have an idea of what it is, contenting ourselves with pointing out some of the places where it may be found and to what uses it may be put. Accident may bring to light what the most devout student has failed to grasp.

After working a day with the divining rod one feels limp, worn out and drowsy. Three or four hours' work in a day is long enough, for when such is carried on too long the amount of electricity which passes through the body engenders lassitude.

A remark that is always hurled at the man with the divining rod is: "When you know so many good things, why don't you keep them for yourself?" The reason is that no man can open out a mine by himself, and if we kept all the good things a man would be claim poor. The rod is the mining engineer's handmaid, which guides his practical knowledge along safe and practical lines.

DAVID KIRKWOOD, M. E.

Victoria, B. C., March 10.

The above interestingly illustrates the truth of the aphorism, "A little learning is a dangerous thing." The sincerity and honest purpose of the writer are manifest. Many believe what he asserts, and his statement is far better put together than the usual arguments received in favor of the divining rod. Superstition lingers along the borders of every form of advancing industrial activity. Whatever his form of faith, the devotee dislikes rude disturbance of his belief, and if a man find happiness in believing such things it were unkind to say him nay.

Fireproofing Wood.

The business of making wood fireproof is growing. The process of rendering wood non-inflammable is not a cheap one as yet, though it is thought that it will be considerably lessened within a few years. One process resembles embalming. The wood is first relieved of its saps and juices, which are really its blood, and a preservative fluid is injected to take their place. The planks to be fireproofed are put into a boiler or digester. This is closed, steam at a low pressure is run and the wood parboiled from ten

to fifty hours, to soften and loosen the dry saps or juices in the fiber. After the steaming process, a vacuum pump draws the saps and juices from the wood, leaving a finely divided cellular structure. The fireproof solution is then pumped into the chamber, absorption and saturation being assisted by the partial vacuum. A pressure from 80 to 200 pounds to the square inch is applied and maintained until the absorption is complete. After draining off the excess solution, the wood is withdrawn and thoroughly kiln or air dried, with the result that the interior cellular wood structure is left filled with minute crystals of fireproofing salts. In a series of tests conducted by fire underwriters small slivers of various varieties of wood were taken from the interior and exterior of treated samples. When held in an alcohol flame, the slivers would char and glow as long as the flame was applied, but in all cases upon the removal of the flame the glow would immediately die out. Combustion was not supported or maintained without the alcohol flame. Samples of 1-inch sheathing which had been boiled for two hours in water showed a depreciation in fireproof qualities, and, in some cases, would support combustion. A blast torch applied to the surface of a treated sample produced no effect beyond charring where the flame was applied. The charred surface protected the inner portions, and it was with difficulty that the sample was burned to any considerable depth.

A Technical Word for Common Use.

The twelfth census may bring into general use a hitherto technical word—"median"—to advantageously replace in many cases the word "average" and in many others the word "center" for the purpose for which they are usually employed. The idea sought to be conveyed by most people when they use the word average, and which is conveyed to them when used by others, is better and more accurately expressed by median. So, too, it is with the use of the word center in many instances, median expressing the precise idea, "center" or "average" only approximating the idea sought to be conveyed. There is a difference between the meanings of these words, as there is between the words "plurality" and "majority."

For example, the average of the population of the United States is 25 years, the median age 21 years. By median age is meant that point at which there are as many above as below. The 80-year-old person has no more influence in pulling up the median age of his community, as will appear from the formula from which such average is obtained, as follows: If there are 157 persons 1 year old, 113 2 years old, 95 3 years old, and so on, the 157 would be multiplied by 1, the 113 by 2, the 95 by 3, and so on as far as the ages go, and then the grand total would be divided by the whole number of persons. The quotient would be the "average" age, being the number of years of life enjoyed by the average person. For statistical purposes the median age is just as valuable for many purposes as the average age, and the establishment of the distinction between average age and median age is important, as numberless errors arise from confusion of the two, just as errors would arise from confounding plurality with majority in discussing election returns.

There is the same difference between the center of population and median point of population that there is between average age and median age. The center of population of the United States is not the point at which there are just as many people south of it as north, as many east as west. That point is not the center of population. At the eleventh census—1890—the center of population was twenty miles east of Columbus, Ind., while the median point of population was about seventy miles to the northeast, in Darke county, O., near the western border of that State. The reason the center of population gravitates west of the median point of population is that the Pacific coast population is on the long arm of the lever, and influences results as the octogenarian does the average age. Counting the Philippines, our center of population would take a big jump to the westward.

W. F. Wilcox, whose field is statistics and economy, and who has charge of the division of methods and results in the census bureau, says: "To assume that the influence of each person in determining the situation of the center of population increases with his distance from the center involves very questionable postulates. Statistical arguments very greatly exaggerate the resemblance between physical and social phenomena. In fixing the center of gravity of a physical mass a unit gains power by remoteness, but in forming the public opinion of a social group the unit loses power by the same fact. The median point of population, the point such that half of the population of the country is east and half west of its meridian, half north and half south of its parallel, offers the practical advantage of being easier to locate than the center, and also, I believe, the advantage of being nearer the average man's interpretation of the term."

COAL TAR by the barrel is worth about 7½ cents per gallon at present, a higher price than usual, being in increased demand as a source of picric acid, which enters largely into the manufacture of the explosive lyddite for the South African war.

Masonry Dams and Retaining Walls.

NUMBER V.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE T. PARDOE.

Since writing the body of the present paper, which has been intended solely to instruct in a method of design, the writer has thought that it might be desirable to give a short appendix containing a few practical hints as to preliminaries. The author has noticed that mine superintendents and boards of directors are often wholly ignorant of the steps necessary to ensure the satisfactory execution of works but suddenly conceive the idea that a dam (for example) would be desirable and forthwith start to build it of second-class materials and of a "guessed" size and height. The result of such an ill-digested scheme is too often unsatisfactory and the actual builder is apt to be blamed instead of the real culprits.

If any reader of these notes should have the misfortune to be employed under "contract" under such an ignorant superintendent (and there are many such) and receive orders to build works foredoomed to failure, he is strongly advised to take the earliest opportunity of stating their insufficiency in writing and by this means he will cover himself from the results of any failure. Any man acting thus, should, however, be quite sure of his ground and be prepared to put his full case into written form, and it is also very desirable that he should have another properly designed work in his pocket, for an ignorant man occupying a superior position would be quite likely to ask his officer "How would you build it then?" and perhaps turn over the whole job, when it will of course be the business of the objector to make a good job of it and get the utmost possible credit for his work.

Now, before building a dam or starting work in connection with it, it is necessary that we have a clear idea of our objects. The two probable objects are: (a) To simply divert the water from one stream into another, perhaps at a higher level. And (b) To act as a storage reservoir to render the supply of water more uniform and perhaps also answer the purpose of (a).

The dam for (a) is usually quite low and is really as a rule better described as a "weir" and may be dismissed from our consideration, a stake and mud dam often answering all requirements and having the merit of cheapness.

Presuming that a storage reservoir is required a survey of the ground is nearly always necessary.

At the head of the ground forming the headwaters of a mining ditch are often alluvial washings not owned or controlled by the ditch owners. A level will then be necessary to determine the possible height of the dam to avoid flooding these washings, or, if found possible to purchase them, how far it will be necessary to do so with the required height of dam.

Now, although many works are no doubt constructed without much preliminary guiding data, and yet give entire satisfaction, yet this is to a great extent chance work, and it is much better to spend time in laying a good foundation for subsequent work. In many cases time cannot be spared for such preliminary work and it is therefore necessary to work more on gumption and instinct as to the advisability of the proposed work, and although it may result in satisfaction, yet subsequent surveys may show that if the dam had only been raised a foot or two higher a much larger storage room could have been obtained, or, on the other hand, that the dam as built is too high already and therefore costly.

There are many cases, however, where no such hurry need occur and it is such cases which prove the value of a steady, level-headed mine manager who is careful to look ahead and see what will probably be wanted in the future and what data are required for the satisfactory design of such works, and who is not too jealous (of any one gaining a little credit) to leave matters at the end of his term of management in such a state that his successor may carry out the works, if desirable, and who is by his predecessor's care provided with the necessary data.

It is therefore desirable, having gone over the ground and determined the approximate position on a stream of the site of our dam, to look lower down the stream for a suitable place to establish a measuring weir, which can be read by the man in charge of the ditch and reported daily or weekly as required. Rain gauges of a size dependent on the amount and intensity of the rainfall should be established, and read as often as practicable, which, in conjunction with the weir readings, will give a means of estimating the probable maximum floods and the ratio of the mean flow to the maximum and minimum flow on which the amount of storage required depends. Data such as these take time to procure and a manager would find it desirable to start the collection of them as soon as the idea of a reservoir is mooted, but some managers have no soul beyond making a big show during their term, by picking out the eyes of the mine and reducing all expenditure beyond that required for the immediate present.

Simultaneously with the collection of these data a contoured survey should be made so as to determine with more or less accuracy the cubical capacity of the reservoir above the outlet.

The method of making the survey will depend pretty largely on the degree of accuracy required and the character of the ground. Generally speaking, if the ground is fairly open, a fairly accurate and close triangulation to prominent and marked positions on the basins will be best, and these points can be connected together quickly and cheaply and with sufficient accuracy with a 4-inch prismatic compass, with which instrument the details can be filled in, and, the triangulation giving a considerable number of starting points, there is no chance of any serious error being carried throughout the work, and, the main points being fixed, the details can be filled in whenever a few days' leisure can be found in the intervals of other work, though it is always more economical to carry a job right through from start to finish without a break, because, amongst other reasons, the surveyor's staff work together better knowing each other from daily work.

NOTE.—A base line is, of course, necessary for a triangulation, and as it is absolutely necessary that this should be laid down accurately, and since measuring rods of precision are not often available, the author suggests that a good plan would be that a single accurate rod of a known length be held up at a suitable distance, and the distance can then be determined by calculation from the angle subtended by it—in other words, by a telemetric method. The angle should be small and an accurate theodolite used, preferably not smaller than a 5-inch. These two points should be permanently and substantially marked, as they form the ultimate basis of the entire survey.

As to obtaining the contour points, the most accurate way is to run separate lines around the basin, closing on to the starting points of the required elevations; but, as this involves considerable labor and time, it would no doubt be sufficient for ordinary mining work to run a single line of stations round the basin, midway between the working limits of the water level and at each of these stations to make a cross level, having its extremities at the limits of the water levels. Having laid down the plan of all the contour lines, it will be necessary to calculate the area of the basin at each contour. There are two ways of doing this:

(a) By dividing up each area into rectangles as large as can be fitted in, and by adding to the area of these rectangles the area of the small irregular figures enclosed between such rectangles and the bounding lines of the contour, the irregular figures being computed by means of a small planimeter. This is by far the quickest method; but, if a planimeter is not available, then we can get at the area by:

(b) Divide up the whole area into squares so small that the outer irregular spaces are practically triangles; we may treat them as such without very serious error, and we can then arrive at the area by a somewhat tedious calculation.

If the plan is drawn to a fairly large scale and great accuracy is not required, a computing scale may be used, consisting of a number of lines ruled, on a piece of tracing paper, at a definite distance apart, so as to form squares of a known area, and, if this scale is superposed on the plan, the product of the number of squares in the length and breadth respectively of the scale will give the area when multiplied with the factor = the area of each square.

It would be desirable that the scale should be rather longer than the maximum breadth of the plan and of a somewhat narrow width. The bounding lines, being irregular, must be averaged by eye into whole squares, and it is this judgment which mainly limits the accuracy of the method.

The drawing of the plan should proceed as nearly simultaneously as possible with the actual survey, and it is very desirable that the surveyor himself should make the plan. The author is specially writing with a view to wild countries, where skilled temporary assistance is unobtainable. The forenoon, for instance, may be occupied by the actual survey, and the afternoon by drawing, the native assistants then being occupied in clearing lines of sight, etc., for the next day's work.

It is usually possible in even the worst countries to find some man who is more intelligent and trustworthy than his fellows, and this man may be put in charge of a gang of peons; but tact is necessary in such a case, for, on the one hand, the surveyor must support the authority of such a foreman, and, on the other hand, must not allow himself to be in any way ruled by him, or allow the men to think that such is the case.

As to the actual construction of a dam, this is not within the scope of the present paper, but, at the risk of plagiarism, the author may give the following few hints:

1. In sinking the foundation trench do not use high explosives, and towards the end use no explosive at all, and better not throughout, and do not stop sinking till perfectly sound, water-tight rock is reached.

2. In building the dam use only perfectly clean, sharp sand, of a variable size and medium grain.

2. If Portland cement is used, let the limit of proportions of sand and cement be 2½ to 1. But the cement should be in such proportion as to entirely fill the interstices of the sand used, after shrinkings, and use only clean water.

4. Make as good a "bond" as possible between stones, but be careful to prevent anything in the

nature of horizontal or vertical joints existing in any large part of the work.

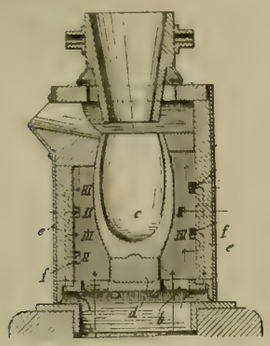
5. Never attempt to join new work on to old "set" work, but keep the old constantly wet and remove any doubtful work; it is cheaper to sacrifice a little labor and money than to endanger the stability or water-tightness of the finished work.

Latest Mining and Metallurgical Patents.

Patents Issued March 6, 1900.

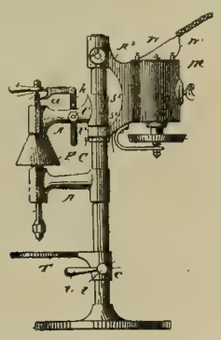
Specially Reported for the MINING AND SCIENTIFIC PRESS.

CRUCIBLE FURNACE.—No. 644,270; R. Baumann Oerlikon, Switzerland.



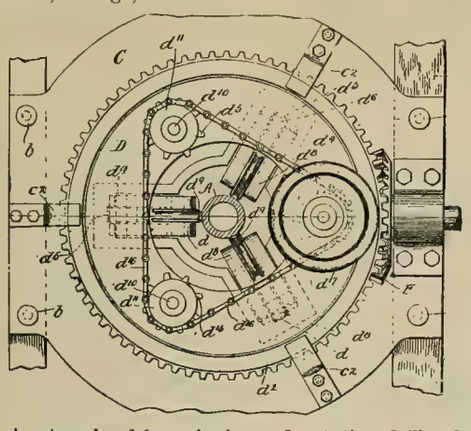
In combination in a crucible furnace of shaft rectangular in cross section, grating at lower part of shaft, crucible and air passages in corners of shaft with horizontal tuyeres extending from the several corners in different directions, the shaft having corners, passages located at corners and having tuyeres located at different levels, those of one level being directed to discharge the air in one direction around shaft and those of the next level discharging air around the shaft in other direction.

ELECTRIC DRILL.—No. 644,591; W. P. Freeman, New York, N. Y., assignor to the Empire Electrical Machinery Co.



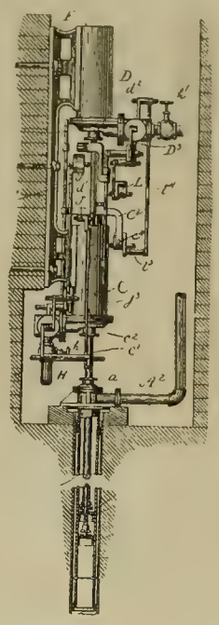
Combination of standard, support extending therefrom, drill stock rotatably mounted thereon, friction gear secured to drill stock so as to rotate with it, motor swiveled to standard, friction gear mounted on shaft of motor armature and means for bringing two friction gears into engagement one with the other.

ROTATING DEVICE FOR ROTARY DRILLS.—No. 644,638; J. B. Rhodes, Harvey, Ill., assignor to F. C. Austin, Chicago, Ill.



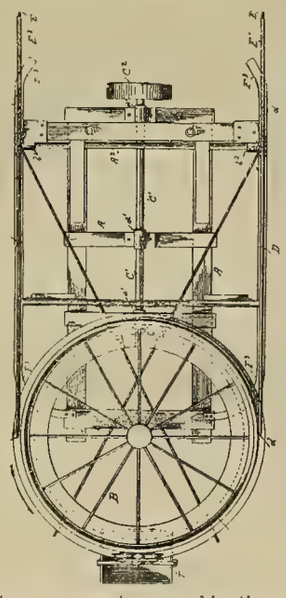
A rotary head for gripping and rotating drill rods comprising a vertically adjustable ring or centrally apertured plate through which the drill rod extends; a plurality of gripping rolls which are carried by the rotary head and adjustable for alternately gripping and releasing drill rod; a plurality of screw threaded rods or standards which are mounted upon head and which extend through openings in ring or plate; an adjusting nut on each rod, and means for connecting adjusting nuts with ring or plate; means for simultaneously rotating adjusting nuts for purpose of adjusting ring or plate along screw threaded rods in direction parallel with axis of drill rod, means for causing such adjustment of ring or plate to effect lateral adjustment of rolls relatively to drill rod, and suitable means for rotating rotary head for purpose of rotating drill.

PUMPING MACHINERY.—No. 644,618; D. H. Maury, Jr., Peoria, Ill.



Actuating mechanism for double plunger pumps, comprising actuating cylinder, piston for each plunger and valve mechanism for admitting and exhausting fluid pressure to effect slow working stroke and quick return of each piston, comprising tappet pawl moving with each piston, two tappet arms arranged in path of each pawl and movable in succession by latter during working stroke of its piston, and reversely arranged lever connections between each pair of tappet arms and valve which controls movement of other piston to that which actuates pair of tappet arms.

ROPE TRAMWAY SYSTEM.—No. 644,675: J. T. Ludlow, San Francisco, Cal., assignor to Vulcan Iron Works, San Francisco, Cal.

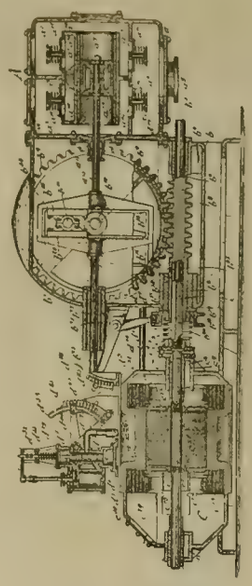


A rope tramway system, combination with track ropes, transfer device located at terminal end of system; switch rails leading onto transfer device, switch movably attached to each switch rail, connection between each switch and track ropes, and means for imparting rotary motion to transfer device; and independent means for conveying carriers onto transfer device and removing same therefrom, whereby carriers are automatically shifted from one track rope to the opposite one; switch rails leading onto turntable, a switch movably connected to outer end of each rail, and connection between each switch and the track ropes.

SOLVENT FOR LEACHING ORES.—No. 644,770; R. W. Kennedy, Ashland, Or.

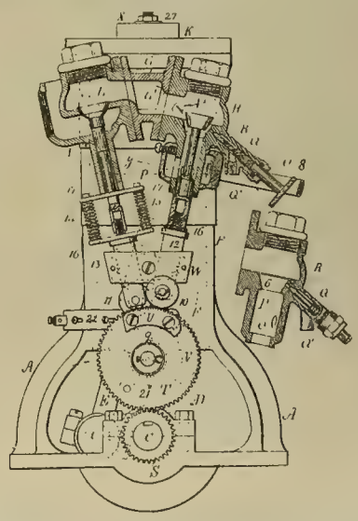
Solvent for leaching ores, comprising sodium thiosulphate, ammonium carbonate and copper sulphate in water, with addition of phosphoric acid, potassium cyanide and sodium or potassium acetate.

ELECTRIC PUMP.—No. 644,852; C. Eickemeyer, Yonkers, N. Y.



Combination, with electric motor and pump operated thereby, of hydraulic regulating device for motor, pipe for conducting fluid thereto directly from delivery chamber of pump, whereby fluid pressure in delivery chamber is transmitted to and automatically operates regulating device, safety armature resistance, supplemental or auxiliary to regulating device, and means interposed between pump and motor for throwing more or less resistance into armature circuit.

GAS ENGINE.—No. 645,044; A. T. Otto, Chicago, Ill., assignor to R. L. Stevens, Hoboken, N. J.



Combination in a gas engine, of cylinder having lateral hollow projection and port with side faces inclined in opposite directions, induction and eduction valves and chests connected upon inclined faces of hollow projection and inclined to each other on radial lines, or nearly so, extending to actuating wheel, a gear on crank shaft and second gear driven by same and forming actuating wheel, cams upon such actuating wheel, rollers and slides for opening respective valves and springs for closing such valves.

TEN years ago an electrolytic bath for the depositing of copper contained 75 to 100 times as much metal in solution as was deposited in twenty-four hours; these figures have been reduced to one-fifth of the values stated, thus the proportion of the metal obtained in the wet way has been greatly increased; the world's daily production is now estimated at 500 tons of electrolytic copper. One of the earlier plans of increasing the output was that introduced by the Elmore Co., in which an agate burnisher was caused to continuously pass over the surface on which the deposit was being made. The resultant metal proved to be of great strength. In a more recent development a sheepskin, impregnated with animal fat, is used as a burnisher. S. Cowper-Coles of London has hit upon another plan, described and illustrated in the issue of the 3rd inst., in which the copper is deposited upon a vertical mandril, caused to rapidly rotate. The centrifugal force developed and the wash of the electrolyte over the rotary surface keeps the latter clean and free from gas, and a smooth and dense deposit has thus been obtained with current densities approaching 200 amperes per square foot.

Notes on Ore Dressing.

NUMBER III.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by A. W. WARWICK.

Some years ago the writer was in charge of a testing works erected by Bowes Scott & Western in London, Eng. In these works was a full-sized crushing plant with a capacity of about fifty tons quartz per twenty-four hours through a 30-mesh screen, and of course a much higher output for the coarser screens. This is mentioned to show that the plant was not a toy; it was a perfectly arranged, gradual reduction system. Two series of tests may be given showing the character of work: in one case the run was of forty-five tons and in the other a run of seventy-five tons was made, and the samples taken fairly represented the average. The first ore consisted of galena and blende in a quartz and shale matrix, and was crushed to a 10-millimeter screen. The result of the crushing is shown by the following figures:

Ore crushed to 10-millimeter screen—

Ore between	6.5	and	10	mms., 35.3%;	lead, 2.3%;	zinc, 6.8
" "	4.0	"	6.5	" 21.7%;	" 3.4%;	" 7.1
" "	2.5	"	4.0	" 13.8%;	" 3.8%;	" 8.9
" "	1.0	"	2.5	" 18.0%;	" 3.9%;	" 9.1
" "	0.25	"	1	" 7.5%;	" 4.2%;	" 9.0
Finer than 0.25 mm				3.7%;	" 5.5%;	" 9.8
				100.0		

The other ore was crushed to a 3-millimeter screen and consisted of very pyritic quartz—

Ore between	1	and	3	mms	40.8
" "	0.8	"	1	"	20.1
" "	0.4	"	0.8	"	17.8
" "	0.25	"	0.4	"	9.8
Finer than 0.25 mm					11.5
					100.0

If the first of the above given screenings be compared with those given by Munroe and those in the Northumberland mill it will be seen how much better work can be done by a judicious arrangement of machinery.

As an example of a first-class crushing plant, the Harney Peak mill for concentrating tin ore may be given. This mill, near Hill City, S. D., is a monument of what a well-designed mill should be. In this mill the ore is crushed to a 2½-inch ring in a 15x9 Blake and then screened in a trommel with 1¼-inch perforations; the coarse goes to a 7x10 Blake, set up fine. The fines from the trommel and the product from the Blake is then crushed in two sets of geared rolls and from these go to a ⅝-inch trommel. The stuff passing ⅝-inch trommel goes to the mill and the rejections to a set of finishing rolls which finally reduces all ore to the desired size.

It will be seen that in this mill the ore is gradually brought down without unduly crushing the valuable mineral cassiterite.

At the Minah mine, Montana, managed by the writer, a gradual reduction plant was working on a silver ore. At different times the fineness to which the ore was crushed was varied; 20-mesh, 25-mesh, 30-mesh screens were used. The ore was first crushed in a rock breaker to about 1-inch cubes. The resulting product was of the following character:

					Per ct.
Coarser than	16-millimeter		screen		65.5
Between	5	and	16	" "	27.2
"	1	"	5	" "	3.2
"	0.75	"	1	" "	1.1
Finer than	0.75			" "	3.0
					100.0

This product was sent to a set of roughing rolls of Krom's make, speed eighty revolutions per minute. After leaving these rolls the ore was screened in a 5-millimeter trommel; the coarse was sent to a set of finishing rolls of Krom type, the fines were sent to the finishing screens. The ore reduced fine enough was then removed to the ore bins, while the coarse was returned to the finishing rolls. The ore from the finishing rolls joined that from the roughing rolls and went to the screen system. The following were the results of crushing:

	Ore from 1st Rolls Before Screening.	Ore to 2nd Rolls.	Ore from 2nd Rolls Before Screening.
Coarser than 10-screen	73.4	27.4	26.0
Between 20 and 10 "	11.8	63.4	22.6
" 30 " 20 "	4.8	8.8	39.8
" 40 " 30 "	3.2	0.4	3.8
" 50 " 40 "	2.4	....	3.4
Finer than 50 "	4.2	....	4.4
	99.8	100.0	100.0

The result of this system of crushing was a very even-grained product and comparatively free from slimes. At different times screens of varying mesh were used and the following screenings were obtained:

SCREEN.	—20-MESH.— Per ct.	Assay for Silver, Ozs.	25-MESH. Per ct.	—30-MESH.— Per ct.	Assay for Silver, Ozs.
Ore between—					
30 and 20-mesh.	49.8	11.0	14.4	.....	....
40 " 30 "	15.5	13.0	21.7	24.5	11.2
50 " 40 "	18.6	13.5	33.9	25.5	14.0
100 " 50 "	1.2	16.4	7.8	7.0	17.7
Finer than 100	14.0	20.2	22.2	43.0	22.5
	100.0		100.0	100.0	

This plant crushed dry and in order to keep down dust the screen chambers, etc., were connected to an exhaust fan. The dust thus drawn off was collected in large dust chambers. This dust assayed from 24% to 28% silver per ton.

It may be of interest to note the output of the Minah crushing plant when using different screens. When using 20-mesh, 26 B.W.S. wire the output was 4¾ tons per hour; with 25-mesh, 28 B.W.S. wire the output was 2⅝ tons; with 30-mesh, 30 B. W. S. wire the output was 1¾ tons. For a short time a 16-mesh, 22 B. W. S. wire was used and the output was about 6½ tons, but the plant was incapable of being fed to its utmost capacity, owing to the ore spouts and launders being of insufficient size. The power required was 50½ I. H. P. Thus:

	I. H. P.
Friction, including engine	18.5
Rolls, two sets	17.4
Rock breaker	7.9
Screens and elevators	6.7
Total	50.5

This power is for all practical purposes constant, whether the mill is crushing to 20, 25, or 30-mesh screens—that is, of course, when it is being run to its full capacity.

Rolls are by no means the only machines used for crushing ores for concentration in ore dressing. At one time or another practically every crusher invented has been used with more or less success. Practically, however, if rolls are not used, recourse is made to stamps—that is, for fine crushing. In gold milling, of course, the gravitation stamp is without a rival, but in the large mills of the Anaconda and in Michigan the steam stamp has driven it out. In spite, however, of many advantages, there can be but little doubt that both types of stamp will eventually be driven out of the concentration mill, except in special cases. However, where the mineral to be saved is tough or hard, no doubt they will be continued in use for a long time. The gravitation stamp, used simply as a crushing machine, is necessarily somewhat modified from the form used in gold milling, in which latter case it is used as an amalgamator as well as crusher. The mortar is naturally very narrow and with a low discharge—in fact, both modifications are carried as far as possible, the limit being set by the increasing wear and tear of the screens.

The stamp is far removed from our ideal of a crushing machine, from the point of view of the ore dresser. The action is very violent and breaks down the mineral particles to an excessive degree. Even in cases where the mineral is as hard, or nearly so, as the matrix, yet by the concentrating action of the mortar the mineral is broken down much finer than is necessary. As an example of this, the tin ore of Cornwall may be given. Here we have a case of a very tough mineral in a tough matrix. The stamps used are very crude and of small capacity, not averaging more than about one-half ton per stamp head per twenty-four hours. A sample of crushed ore from the Cook's Kitchen mine, Cornwall, was tested some years ago by the writer.

Ore between—						
30 and	25-mesh	screen,	1.0%,	value	12	lbs. tin per ton.
60 "	30 "	"	7.5%,	"	12½	" " " "
80 "	60 "	"	25.5%,	"	14	" " " "
100 "	80 "	"	4.1%,	"	16	" " " "
Finer than	100	"	61.9%,	"	21	" " " "
			100.0%			

This ore was worth about 18½ pounds tin per ton. On crushing, as shown by the screenings, about 75% of the value was put into the slimes. It need scarcely be wondered at that the loss of mineral is from 12% to 20%, or an average say of 15%. Were it not for the great skill of the Cornish tin dresser, however, the losses would be much greater.

As an example of the crushing done by a California stamp mill the work of a 10-stamp mill near Danby, Cal., may be given. The ore is porphyry with seams of oxides of iron and iron pyrites running all through it. The ore is quite soft. Weight of stamps 850 pounds, 6-inch drop, 7-inch discharge, crushing to 30-mesh, B. W. S. wire.

Between	40 and	30-mesh	0.41%,	value	$3.55,	% pyrites 1.2
"	80 "	40 "	9.55%,	"	4.75,	" 1.8
"	100 "	80 "	10.58%,	"	5.85,	" 3.45
Finer than	100	"	78.75%,	"	5.90,	" 3.60
			98.99%			

Although this is hardly a fair example of the average work of a California stamp mill, owing to the soft character of the ore, yet it may be seen that about 89% of the pyrites went into the slimes.

Another set of screen analyses made by the writer on the Drumlummon, Montana, mill pulp gave somewhat better results. The ore is very hard quartz; 750-pound stamps, 8-inch drop, 30-mesh wire screens. The pulp on screening gave these results:

Between	40 and	30-mesh	2.79%,	pyrites, etc.,	1.35
"	80 "	40 "	24.80%,	" "	1.60
"	100 "	80 "	9.78%,	" "	1.72
Finer than	100	"	62.60%,	" "	2.21

In this case we again see that the fines give by far the highest proportion of mineral values.

Possibly the most complete experiment made on the relative efficacy of stamp and roll crushing, for concentration and ore dressing, is that made at Pzribram, Bohemia, some years since:

	Rolls.	Stamps.
Ore treated	600 tons.	600 tons.
Lead ore obtained	20.923 tons.	26.52 tons.
Value concentrates	3101 florins 42 kr.	2821 florins 95 kr.
Deduction for zinc	575 " 29 "	816 " 27 "
Net val. concentrates	2526 florins 13 kr.	2005 florins 68 kr.

The lead ore was made up as follows:

Rolls—

10.251 tons	grain ore, containing	40 %	lead, 10.9%	zinc.
10.672 "	slimes "	"	15.8% " 21 %	"
20.923 tons.				

Stamps—

6.235 tons	grain ore, containing	18 %	lead, 18 %	zinc.
20.285 "	slimes "	"	15.5% " 21 %	"
26.250 tons.				

These carefully conducted experiments* show that the machine producing the least slime will, other things being equal, give the best product. In both cases the slimes were of practically equal value per ton, but the rolls produced only one-half of what the stamps produced. This test certainly shows a remarkably higher efficiency for the rolls, and there is no doubt that the results are directly due to the smaller amount of fines made by them as against the stamps.

To summarize the foregoing, it seems that gradual reduction of ore to the desired size will be a feature of the modern mill. Modern practise in all branches of industry tends to the ascertaining of the exact nature of the work to be done and then to adapt the machinery to the case in point so that the best results may be obtained at the least cost. Undoubtedly, in the newer mills the crushing department will be regarded as distinct a division as the engine room itself. Mere capacity of the crushing plant and a low cost of handling, regardless of the product obtained, will not be the ruling ideas. Given a well-crushed product the whole of the after operations are rendered simpler, more efficacious and therefore cheaper.

While considering the nature of the crushing required it may be well to consider what may be called the secondary crushing department. In the process of separation a fairly large quantity of material is made, consisting of "middlings." These, from the machines treating the coarser grades of broken rock and mineral, consist partly of fragments of pure minerals and partly of fragments of intermediate specific gravity, due to the particle being made up of two or more minerals. In this latter case the mineral can not be further separated without finer crushing, and this is usually done by crushing machines independent of the primary crushing machinery. This, of course, is in larger-sized plants; in a small mill these middlings are returned and take their chance of being crushed finer in the primary crushing machines.

If a secondary crushing plant is necessary, the interesting question arises whether it would not be the best policy to crush the whole of the rock more coarsely and thus to make more of these middlings. The points in favor of this scheme are: (1) At one operation a large amount of barren material is removed. (2) The amount of slimes made is greatly reduced. (3) The cost of crushing would not be so great.

There is much to be said in favor of this system and it undoubtedly should receive consideration in the design of large plants intended to handle low-grade ore or where the mineral is hard to save. The writer hopes at some future time to recur to this subject.

*J. Habermann—Berg und Huttenmannisches Jakebuch der K. K. Bergakad, zu Loeben, etc., vol. 30, p. 1.

Improvements in Steam Engine Practise.

Consul-General Mason of Frankfort, Germany, says some German professors have succeeded in devising a plan by which a large quantity of the energy in the shape of low-powered steam is saved and utilized by the new process. Liquid sulphurous acid, acted upon by the latent heat of the waste steam given off from a compound engine, is utilized to run an auxiliary engine, and some remarkable statements as to the value of the process are made. In the plan mentioned the exhaust steam passes into the surface condenser, or vaporizer. In this vaporizer the cooling medium used, instead of water, is liquid sulphurous acid, which has a boiling point so low that it is immediately decomposed by the heat of the exhaust steam, whereby the sulphur dioxide gas is liberated, which passes over into the cylinder of the auxiliary engine where its work is done as in an ordinary steam engine. By this invention the steam power is increased to the extent of 56%, and, instead of yielding only 1 H. P., 1½ H. P. is capable of develvopment, the extra ½ H. P. being applied by means of the auxiliary engine. Little added expense is said to result from the use of the new plan, and it may prove commercially successful.

MINING SUMMARY.

ALASKA.

A stampede from Nome northward is the latest, men preparing to go from there 100 miles farther north, and to the Siberian coast opposite. Large numbers are preparing to leave San Francisco and coast ports for Cape Nome next month.

ARIZONA.

MOHAVE COUNTY.

(Special Correspondence).—In the early days of the American Flag mine, situated in the Wallapai mountains and owned by four Cornishmen, of whom Monte Pemberthy is the survivor, they packed their ore from the mine to Hardyville, on the Colorado river, thence it was sent down the river, through the Gulf of California and up the Pacific coast to the Selby Smelting Works in San Francisco, at a cost of $11 6 per ton. For especially rich ore the cost was as high as $160 per ton. This property has produced $400,000. The same condition obtained at Chloride, Stockton Hill, Cerbat and Mineral Park.

At Chloride, when silver float was discovered, many shallow holes were dug, the rich surface ores extracted and shipped by "chloriders." Hence the name "Chloride." An adobe town flourished for several years, but was superseded by Mineral Park, Cerbat, Stockton Hill and other districts.

The Tennessee mine, bought by E. T. Loy two years ago for $5000, is being worked. The deepest shaft is 350 feet, where the vein is from 5 to 25 feet wide and runs 54% lead, twenty-two ounces silver and one-fourth of an ounce in gold. Eighteen thousand gallons of water are daily taken out of the mine, which is used over and over again. Twenty to thirty cars of concentrates are shipped per month. The mine gives employment to fifty-five men.

The Lucky Boy, owned by Chicago people, T. B. Scott and others, is down 180 feet and has 6 feet of ore in a crosscut, which carries silver running from 159 to 800 ounces and from three to as high as twenty-five ounces in gold. The present owners purchased this property in August last, paying $15,000 for it.

The Pay Roll is under bond to Colin Timmons of Leadville, Colo.

The Badger, owned by Cleveland people, is working ten men.

The Juno M. Co., with E. T. Loy Mgr., has a shaft 340 feet deep and has a level at 220 feet and 320 feet in good ore. This property in former days shipped $400 ore to San Francisco. A fine steam hoist is on this property.

The Merrimac, owned by Philadelphia people, consists of two claims and has the deepest shaft in the district, 450 feet. It has a 50-ton concentrator, seven to eight tons being put into one. Thirty men are employed and the property was bought less than two years ago for $7500.

The Empire No. 2, owned by G. W. Beecher and E. F. Thompson, has a vein width of 30 feet at a depth of 150 feet and the pay streak is between 2 and 3 feet wide, running in silver and lead.

In the White Hills district, sixty miles north of Kingman, twenty men are at work on a new body of ore, which under the present management will be worked systematically.

At various points along the Colorado river placers and gold quartz claims are being slowly opened up.

Chloride, March 10.

CALIFORNIA.

AMADOR COUNTY.

Supt. Porter of the Baliol mine, Sutter Creek, says the mine has been sold to a German syndicate.

CALAVERAS COUNTY.

(Special Correspondence).—The copper mines known as the Satellite and the Penn Chemical Works are now known as the Penn M. Co.'s property, owned by the Penn M. Co. A. C. Harmon is Supt. A furnace is in successful operation.

Campo Seco, March 13.

MARIPOSA COUNTY.

(Special Correspondence).—On the Mariposa Grant bottom has been struck in the old shafts, both at Princeton and Mariposa. The former is reported looking well, but in the Mariposa the shoot has gone out.

Development on the Pine Tree and Josephine at Bear Valley continues and both mines are looking, if anything, better than was expected. A meeting of the owners will soon occur on the property, when plans for more extended operations will be matured. It is reported and denied that the electric power plant at Merced Falls has been purchased, together with the machinery now on the Mt. Gaines, for use at Princeton.

The Nameless M. Co. is developing the Bonanza and Elizabeth claims in White's gulch.

A. P. Dron of Big Oak Flat has an option on the Red Cloud and will pump it out at once. This was once the richest mine in Mariposa county, but at the 600 level the ore shoot was lost. Five years ago a Boston company spent $60,000 between the 600 and 700 levels in an unsuccessful search for it.

The Quail remains closed in a tangle of lawsuits and attachments, workmen and local merchants holding unpaid claims to the extent of about $3000.

The Columbus has been virtually idle since Jan. 1st, though work on the power plant continues.

Three companies, with about twenty men, are working in the Bull Creek district.

The Egenhoff mine on Hall's gulch has cut the vein in the low level tunnel and has 3 feet of high-grade ore.

The Sierra Buttes Co. has closed the Tendron at Whitlock's for an indefinite period.

The Merced Co. is sinking the main shaft of the Mary Harrison from the 700 level and has about reached the 800, where a station will be cut. A winze is also being sunk in the vein from the 700 to the 800 and is in fine looking rock. A long crosscut is also being driven into the hanging wall country. No available ore was left in the mine above the 700 when the mill stopped on Jan. 1st, and it is not expected the mill will be run during the current year. The cave, which at one time threatened to close the mine, continues to some extent.

Brown & Rogers have bonded their Pinon Blanco property to Ph. Deidesheimer.

There are reports that the Tyro is to be unwatered for examination.

The Alice Clark is closed indefinitely. The mine was never in good repute locally, but a well-to-do Stockton syndicate were led into equipping it with machinery and mill and made considerable development on it, without success.

The suit pending in San Jose against the promoters of the Golden Crown-Big Betsey deal by some of their patrons excites much interest locally. The character of the deal was notorious throughout Mariposa county and the incredible statements in the prospectus should have put any resident of a mining State on his guard.

Bear Valley, March 5.

KERN COUNTY.

(Special Correspondence).—The Warrington M. Co., at Havilah, has been attached by U. T. Smith. The Warrington Co.'s officials and owners of stock are in St. Paul and Minneapolis and the work has been carried on by R. C. Shaw. Mr. Shaw resigned and G. Thede has charge of the property. The mine had been worked to a depth of 400 feet, and prospects were so favorable that machinery and material were placed on the mine while work of construction, etc., was in progress. The mine, being unpatented, became jumpable, and P. O'Brien jumped it, stood a large number of men off with a Winchester, being stationed in a tunnel, and the company lost the property. Later, W. H. Blaisdel of Yuma bonded the mine and spent $30,000. The property fell into the hands of D. S. Lightner and he sold it to Los Angeles parties and they to the present company. The mine is considered to be rich, and poor management has kept it from being on a paying basis. It is the intention of the present company to push down a deeper shaft. They now have equipped a 10-stamp mill and complete cyanide works.

Caliente, March 10.

Randsburg reports scarcity of water; the Yellow Aster mill has shut down half its stamps. Capt. Collins, who purchased the Black Hawk mine, has developed water between Randsburg and Garlock, and proposes to lay pipes eight miles. He is locally credited with intent to add thirty more to the thirty stamps in that mill and build a 30-stamp mill at his mine three miles from Cuddeback lake.

MONO COUNTY.

In 1899 the Standard mine of Bodie produced $422,615. The amount of ore reserves in the mine is estimated at 6400 tons.

NEVADA COUNTY.

(Special Correspondence).—At the Gold Hill mine, Grass Valley, good progress has been made since work was resumed. The shaft is 200 feet deeper, making it now 1250 feet. Drifting goes on at the 1200 level. A 250 H. P. synchronous motor has been substituted for one of less power to drive the air compressors, of which there are two—one of 140 H. P., the other of 70 H. P. A direct-acting electric hoist has also been added. Formerly the hoist was run by compressed air, and the engine therefor, with its attachments, still remains in place and can be resorted to in case of need. The mine is heavily watered, but the water is handled in good shape by Dow pumps stationed at various levels in the shaft. These pumps are run by compressed air, as are the machine drills, the air being re-heated before use. No mine in the county relies more fully upon electric power than the Gold Hill, though it has a steam plant to fall back upon in case of an emergency. E. W. Hopkins has been prospecting this mine since 1896, having been encouraged thereto by its early history. It had been idle for many years, and of course had filled with water. R. Walker is Supt.; C. T. Rounes, chief engineer; R. F. Barry, foreman.

The Pennsylvania mine, on Ophir Hill, near Grass Valley, has a model plant for one of its capacity. Over one year ago a new 10-stamp mill replaced one of the same capacity. Since then new hoisting works have been completed, as well as one of the Gates' slime plants. The new double-reel friction hoist, run by steam, is a fine machine. The pumps are also run by steam. Electricity is the motive power in the mill, where, besides the stamps, there are three Johnston concentrators. All of the buildings, except a new and commodious office, are sheathed with corrugated iron, painted lead color. This mine has been developed entirely by local stockholders. They paid assessments for many years, but for the past three years they have been receiving liberal dividends. The ore ranges in value from $20 to $30 per ton; 700 feet is the depth of the shaft. B. Opie is Supt.; A. Argall, Sr., foreman.

The Coe mine, in the eastern outskirt of Grass Valley, is being reopened, and will be one of the active enterprises of the district. Nothing had been done on the property for many years, and the mine had filled with water. Its early history, together with the excellent character of the outcropping vein, encouraged an Eastern company, headed by O. A. Turner, the Supt., to buy the property for cash. Their first work was to reconstruct the old buildings and revivify the old pump. Pumping began last November. Since then the shaft (540 feet deep) and drifts have been unwatered. Some retimbering in the shaft was necessary. I found in each of the drifts a well-defined ledge of ribbon quartz, from 1 to 3 feet in width, between walls of grano-diorite and serpentine. Comparatively little stoping had been done by early workers, leaving this almost unworked. The company will build a 20-stamp mill. W. S. May will superintend its erection. New and improved machinery will be procured for the hoist. Electricity will be the motive power. The works are situated within a few yards of the power line of the Nevada County Electric Power Co. The company will begin sinking at once. They expect to have 100,000 tons of ore ahead by the time the mill is ready.

Grass Valley, March 12.

With the new pump at the Merrifield Supt. Zeitler says he can sink 3000 feet.

PLACER COUNTY.

(Special Correspondence).—At the Bellevue mine, near Ophir, a new Cornish pump has been started, and the mine is being unwatered preparatory to development work. The hoist and pump at this mine are both run by a 36-foot overshot water wheel. After the water has been taken out of the 200-foot shaft it will be sunk 100 feet deeper before any drifting is done. Then twenty men will be employed. The same company owns the Bullion, an adjoining location, where there is a vertical shaft 120 feet deep. Work will be resumed here later in the season. These claims are owned by Auburn business men.

Houchin & Dixon, on an extension of the Conrad, one and one-half miles from Auburn, are sinking an incline shaft on the ledge, and are now down 160 feet. They have run a drift both ways from their first level (80 feet) and are now 70 feet from the shaft at their second level (160 feet). They are taking out fine-looking quartz, which is being milled at Malmsberg's 5-stamp custom mill, one-fourth mile distant from the mine. They have a 2-foot ledge of quartz between slate walls.

Work has begun at the Big Bonanza mine, formerly the Eureka and Eureka Extension, two miles south of Auburn. A new shaft has been started upon a shoot in a 6-foot ledge which outcrops boldly at the surface. The ledge had been prospected through tunnels at various places in former years, but there was no capital behind the work. Present operations are being pursued by people who can put in a good plant if developments warrant. W. C. Hooper is foreman of the work, with ten men employed.

At the Hidden Treasure gravel mine, near Michigan Bluff, the management has finished the installation of a new electric plant for pump and hoist at the inside station, one and one-half miles from the mouth of the tunnel. Power is derived by connecting with the trolley wire which supplies energy for running the electrically propelled ore cars. The hoist runs 32 feet to a second channel recently discovered, and twenty tons of gravel per hour can be raised.

Auburn, March 10.

SAN DIEGO COUNTY.

The Golden Cross is again in court. J. D. Hanbury sues to recover $5000 expenses and $295,000 commission. He claims that the company contracted with him in January, 1896, to find a purchaser for the property at $3,500,000. Any valuable mining property is liable to be similarly attacked.

SHASTA COUNTY.

(Special Correspondence).—Near Shasta, Murray Bros. & Co. are developing an 18-inch ledge of high-grade ore and are making shipments to the Keswick smelter.

The Appel mine, near Keswick, has begun ore shipments. They are operating under bond and lease, paying a royalty of 8% of smelter receipts.

In a canyon of the Corinne mine three nuggets were found last week weighing $14 each.

The Oro Vista Co. continue development on five claims, in one of which a 30-inch ledge of high-grade shipping ore has been opened.

The Gray Eagle mine, near Shasta, is developing a 7-foot ledge of low-grade smelting ore.

On the Black Spider mine, near Keswick, the shaft is in footwall country, faced in syenite carrying auriferous pyrites and chalcopyrite, running $9 a ton. Station cutting and drifting will be in progress in another week at 100 feet depth and shipments begun to the Keswick smelter.

The DeLamar Co. is about to build a steel bridge across Pitt river on the road from Redding to Bully hill.

The Mountain Copper Co. has a large force developing the recently acquired Stowell property, near Copley.

Christensen & Carlson are shipping ore from the Orpheus mine at Muletown to the Keswick smelter.

Redding capitalists have organized to establish an electric power plant on Pitt river, twenty-five miles north of Redding, to furnish power to mines and light for Redding. To date $25,000 has been subscribed. It is expected that $75,000 additional will be signed this week.

Redding, March 12.

(Special Correspondence).—Work has begun on the second smelter in this county at the Bully Hill mine, twenty-two miles from Redding; daily capacity, 200 tons. Unlike the matte product of the Keswick smelter, which has to be shipped to New Jersey to be refined, a converter will be put in at Copper City—the name of the site of the plant—and the matte will be refined there, the first of the kind in California. The product of the converter will be black copper about 97% pure.

At Keswick the Mountain Copper Co. has raised miners' wages from $2.75 to $3 and muckers' from $2 to $2.50.

Redding, March 14.

SIERRA COUNTY.

A hundred more good mine leasers could find employment at Hillsboro, says the Advocate.

SISKIYOU COUNTY.

The Journal reports that the river miners along the Klamath are preparing for reopening claims, building wingdams and putting in wheels. The heavy freshets have cleaned the river of tailings and rock piles, thus allowing better opportunity in sinking to bedrock of the river channel, where rich pay is found.

The Portland Extraction Co., on Salmon river, has a plant for the treatment of low-grade ores and sulphurets. H. A. Townsend is Mgr.

TUOLUMNE COUNTY.

(Special Correspondence).—They have just struck the ledge at the Clio mine through a crosscut on the 100-foot level. The vein is 8 feet wide and shows free gold all the way across. There is a 4-foot gouge on the foot wall that will pay at least $10 per ton. The company will put in a large hoist at once. J. E. Potter of Boston is part owner and Mgr. of the mine, and T. W. Webb foreman.

Jacksonville, March 13.

(Special Correspondence).—The new 10-stamp mill of the Mount Jefferson has commenced crushing. Its erection has been delayed on account of the weather, it being desired that the foundation be in proper condition. The stamps weigh 1100 pounds each. The Mount Jefferson has been extensively developed under the conservative management of J. M. Meighan for three years, and it is intended to increase the crushing capacity gradually. The main incline is 350 feet in depth. At the 300-foot station the east level is 350 feet long and the west level 200 feet. At the 200-foot station the east level is 270 feet in length and the west level 175 feet. The pay ore is from 5 feet to 6 feet thick

and is expected to yield $18 per ton in gold.

At Big Oak Flat the Accidental (the west extension of the Longfellow) is also being developed in a substantial manner. The main incline is 320 feet deep. Ph. Deidesheimer is now its Supt.

Groveland, March 12.

Supt. Hardy of the Santa Ysabel favors raising funds for further exploration work. He says that the surface equipment at Santa Ysabel is equal to any in that section, and that the recent experience of that mine has been but the experience of many mines in that region, now profitably worked.

COLORADO.

BOULDER COUNTY.

At the Cold Spring mine, Gold hill, Boulder, the tunnel is in 1100 feet. At the point of intersection the breast of the tunnel will be 650 feet below the surface. An electric exhaust fan at the bottom of an old shaft, which intersects the tunnel 300 feet from the mouth, works with a speed of 2000 revolutions per minute and exhausts the powder smoke from the breast of the tunnel in thirty minutes.

CLEAR CREEK COUNTY.

At Georgetown the Doric Co. will spend $50,000 to further prospect the hill and those veins already cut. Some drifting on one vein has opened a body of mill ore.

CUSTER COUNTY.

The Bassick mine, near Querida, has been unwatered, retimbered and repaired, the shaft sunk 100 feet deeper, opening up ore on which men are drifting. The old machinery is being replaced with modern appliances, and the property is expected to be a producer this summer.

FREMONT COUNTY.

The Milliken ore reduction mill, to be built at Florence, will be 350x550 feet. An electric plant will furnish power, by which all the departments will be operated. The electric generator will be driven by a 500 H. P. engine. There will be storage bins to accommodate 5000 tons of ore, six 40-foot roasting furnaces and eight 12½-ton chlorination barrels, with a concentrating plant of thirty tables. The daily capacity will be 300 tons.

LAKE COUNTY.

In the Midland at Leadville is a remarkable ore body, the vein in the contact above the lime being between 3 and 4 feet wide of chlorides that run 1000 ounces silver to the ton. It has been opened for 30 feet.

The manager of the Yak tunnel says there will be no cessation of work until the Ibex properties are reached.

The Boston Gold-Copper Smelting Co. is a concern independent of the smelter trust. Plans are under consideration to increase its capacity from 200 to 1000 tons per day.

MINERAL COUNTY.

At Creede the Ridge mine has resumed and employs fifty men.

SAN JUAN COUNTY.

E. G. Stoiber has bought the South Side and Gold mining claims, adjoining his San Juan property.

TELLER COUNTY.

The Eclipse No. 1, New Haven, shows a 6-foot vein carrying quartz seams and sylvanite.

The Standard Oil Co. are still developing Copper mountain.

The Hood Carbonate is to have a large steam hoist.

The Monarch Co. has begun work on a new shaft on the Minnehaha.

The Woods Investment Co.'s new purchase, the Mabel M., of Beacon, has 2 feet of good ore in the bottom level, and soon will begin making regular shipments to the smelters.

IDAHO.

OWYHEE COUNTY.

The Avalanche hears that W. H. Dewey has sold all his stock in the Trade Dollar Con. M. Co. for about $1,000,000 cash.

MONTANA.

BEAVERHEAD COUNTY.

Gen. Mgr. Knippenberg, Hecla Con. M. Co., Glendale, in his annual report, says: "A review of our operations for the year 1899 shows most unsatisfactory results, arising from the fact that we did not have ore in sufficient quantity. The small profit realized from the year's business is shown by the following:

Total receipts from sale of product, etc	$199,556 04
Expenditures for the year.	187,092 90
Net profit, 1899	$12,463 14

"In August we purchased the Condor, Pride of the West, Minnie Gaffney and Moffat & Maynard mining claims for $12,250. The above item, 'expenditures for the year,' does not include this amount, nor Dividend No. 146 ($15,000); these do not belong in the expense account. In December, 1899, conditions at the mines promised fairly good results for that month, and January and February, 1900, likewise. Considering these circumstances, the board of directors concluded to take some risk, and declared a 1% dividend, $15,000, to be paid to the stockholders on Dec. 23, hoping they might pay another in January, and, possibly, one in February. Their expectations were not realized. By Dec. 23 the daily ore supply was exhausted and it became necessary to close down the smelter, perhaps for a month, or even longer." The product of the mines in 1899 was as follows: Lead bullion, 838,894 pounds; copper matte, 155,719 pounds; silver, 249,738.27 ounces; gold, 219,155 ounces. S. A. Barbour, Supt. of the mining department, reports in part as follows: "The cost of mining the first-class ore, taking the above total expenses, was $30\frac{623}{1000}$ per ton. The increased cost of mining was due to the greater amount of prospecting or dead work to find ore, and also to the smallness of the ore when found, making the mining of it more expensive."

CASCADE COUNTY.

The Boston & Montana C. C. & S. Co., in its annual report for the year ending Dec. 31, '99, shows:

ASSETS.

Cash and accounts receivable at Boston, and copper, silver, gold and bluestone sold but not paid for	$5,507,830
Cash and accounts receivable at Butte	73,748
Supplies on hand at Butte	287,294
Cash and accounts receivable at Great Falls	1,926
Supplies on hand at Great Falls.	275,123
Total assets	$6,145,921

LIABILITIES.

Accounts payable at Boston	$483,584
Accounts payable at Butte	340,920
Accounts payable at Great Falls	215,910
Accrued interest on bonded debt	9,415
Total liabilities	$1,049,829
Balance of assets Dec. 31, '99	$5,096,092

In his report the superintendent says: "The total amount of advance in the development aggregates 28,757 feet, or nearly five and one-half miles. In addition, 18,525 cubic sets were removed from the stopes.

"The amount of ore in sight Jan. 1, '99, was estimated at 2,161,597 tons, while we estimate the reserve in sight and undercut on Jan. 1, 1900, at 2,500,000 tons. In this connection it should be stated that such large reserves necessitate a corresponding expense of maintenance, and therefore during '99 the intention was to so proportion the development to ore extraction as to maintain the reserves at about 2,500,000 tons.

"The contemplated construction for the coming year will be: A new hoisting engine for the Mountain View shaft, which should be powerful enough to operate from a depth of at least 2000 feet greater than present depth; a new pump for the Leonard shaft, powerful enough to pump ultimately 1250 gallons per minute from the twelfth level. When this is erected the pump which is now at the sixth level of the Leonard will be used at some other mine. Underground and on surface considerable improvement has taken place, and in general the mines are in a very efficient state.

"At Butte we have continued to lease and operate the Butte & Boston smelter. The operations and costs have been satisfactory throughout the year. On Feb. 1, 1900, the Boston & Montana Co. turned over this smelter to its owner, the Butte & Boston Co. The capacity of the new No. 7 furnace has been brought up to 165 tons per day, and with careful work it can be kept to average this for months at a time. It will take nearly the whole of this year to complete the contemplated construction. When completed the capacity of the plant will be increased about two-thirds, and in case of necessity we believe the plant could treat double our present quantity of material. The increase will depend, of course, on the grade of ore treated."

The company has paid the following dividends: On July 28, '88—its first—$2 per share; in '89, one of $2 per share and three of $1 each; in '90, two of $1 and two of $1.50; in '91, four of $1; in '94, two of $1; in '95, one of $2 and one of $5; in '96, two each of $2 and $3; in '97, four of $3; and in '98, two of $3 and two of $5. In '99 the company paid the largest dividends in its history, consisting of one of $5, one of $6, one of $10 and one of $15. Feb. 20, 1900, a dividend of $8 was paid. Altogether the company has paid $15,725,000 in dividends.

LEWIS AND CLARKE COUNTY.

C. W. Whitley, Mgr. American Smelting Co.'s smelters and concentrators, East Helena, says he will build a roaster, building and furnaces, including a new stack, to cost $100,000. The present capacity of the plant is 750 tons per day, and over 50,000 tons of ore are at present on the dumps awaiting treatment. The roasting capacity of the plant will be thus doubled.

MADISON COUNTY.

J. H. Conrad says the Madisonian mine, Norris, is sold to L. Z. Leiter of Chicago. The price is understood to be over $200,000. T. L. Trerise will be manager.

SILVER BOW COUNTY.

The Homestake mine in Park canyon, near Butte, has been bought by the Montana Ore Purchasing Co. for $100,000. There is a large body of low-grade copper ore, averaging about 6% in copper and ten ounces in silver.

NEVADA.

LINCOLN COUNTY.

(Special Correspondence).—Eagle Valley Mining District: The writer left the present terminus of the Oregon Short Line at Milford, Beaver county, Utah, boarding the train of the Utah & Pacific, which runs from Milford to Uvada, a distance of seventy-five miles over a level stretch of plain, lying between parallel mountain ranges. The latter road was completed last year under the direction of the president, A. W. McCune, of Salt Lake City. At Lund station, stages and freight teams go to Cedar City, while Modina is the shipping and staging point for St. George, Utah, and Grand Gulch, Arizona. Uvada is the present terminus of the road and is located on the line between Utah and Nevada; and is the shipping point for Stateline, Utah, and Deer Lodge, Pioche, Panaca, De Lamar and other points in Lincoln county, Nevada. Deer Lodge is seventeen miles northwesterly from Uvada and is the new town containing the records of Eagle Valley mining district, organized in December, 1895. About 300 locations have been recorded. The district embraces an area about four by fifteen miles, extending along the western slope of a mountain range trending northward and southward, the boundary line of Utah and Nevada being near the crest of the range. The altitude of Deer Lodge is about 6700 feet, being located in a ravine where there are wells of excellent water. The smooth, oval-shaped hills and ridges which characterize the surface generally are covered by a thick growth of scrubby cedar and pine timber, which is serviceable for fuel, the construction of cabins, etc.

The country rock is porphyry and the hills have been worn down by the erosions of nature, leaving exposed outcroppings of the most distinct character. The ledges thus exposed, on being exploited, are shown to be between well-defined walls, the gangue rock being composed of quartz, feldspar, talc and decomposed material. The quartz, spar and talc carry free gold, even at the surface, considerable of which is visible to the unaided eye, though the minuteness of the gold particles as a rule place them beyond the reach of the ordinary amalgamating method. Present exploitation and development indicate that the bulk of the ores run from $6 to $20 gold, though there are various streaks which run higher. The ores are highly siliceous, containing very little of the pyritic bases or sulphides, and so far as tests have gone they are considered well suited to cyanide and chlorination processes. The work on the average claim does not go deeper than 20 to 50 feet, though there are three shafts in the district which sink from 180 to 220 feet and several tunnels which cut ledges at considerable depth.

The outcropping veins exposed are numerous and parallel each other, and in many cases an outcrop is traceable from hill to hill.

The most important operations of the district are those of the Horseshoe G. M. Co., at the head of which is A. W. McCune, above mentioned in connection with the Utah & Pacific railroad. This company have a large area of ground in a body, including several groups of mining claims. Their headquarters are at Fay, a new town one and one-half miles from Deer Lodge, and where their office, store, boarding house and cottages are already built. A pipe line, four miles long, connects Fay with springs of water at a higher altitude and the supply thus afforded is ample and of good quality. The Homestake group of this company has a 180-foot two-compartment shaft, from which crosscuts are being run to the ledge, which outcrops at a higher point. A steam hoist and compressor are set up here and air drills will be used as soon as possible. At the Horseshoe group two shafts have been sunk about 200 feet each, by whim work, on the vein, with drifts in opposite directions at the 100 and 200-foot levels. The work here has been sufficient, it is deemed, to demonstrate the character and value of the ore and, to a large degree, the extent of it. On the same group machinery for hoisting and air compression are to be put in. In the same locality, along the water line, a 100-ton cyanide reduction plant is being erected, the material for the building and equipment being partly on the ground. The operating features will consist of crushers, coarse and fine rolls, elevators, screens, driers, leaching and solution tanks, precipitation apparatus and suitable steam power plant. The plans provide for a skip to carry the ore from the mine shaft to a point up the gallows frame, thence to crushers. The work and equipment of this company are of a thorough and substantial character and their success will doubtless be a demonstration of value to other properties in the district. It is understood the Horseshoe Co. have bonds on other claims in the district and that they are developing some claims in Pike's diggings, four miles southeast of Deer Lodge.

Joining the Horseshoe holdings on the west is the group of thirteen claims known as the Indiana, belonging to H. L. Pickett and associates. The grounds covered by this group have four or five outcropping ledges, on each of which is considerable development which shows values ranging from $6 to $10 near the surface.

The Gold Bug group, northwest of Deer Lodge, belongs to Hammond, Lytle, Moody and others, and is developed by a 300-foot tunnel on the vein, on which it is considered there is an excellent showing. The ores here carry some silver as well as gold. Here, as elsewhere, the float will horn free gold. The ledge, where opened, is of good width.

The Interocean group, located by Bennett, Ross and others, one mile west of Deer Lodge, is also typical of the district, so far as indications go, and has some development.

The Ross group is provided with buildings and has several hundred feet of development work done, some ore shipments from which have been made.

The Mohawk group of four claims joins the Horseshoe on the north and the Homestake on the south and belongs to John Ryson of Deer Lodge, who has bonded it to D. A. McDonald of California.

The Fawn, belonging to Daniel Ross and others, comprising three claims, recently made a strike of free gold in white quartz and silver in hematite of iron, which ran well. This was found within a few feet of the surface.

The first cabin in Deer Lodge was built by W. T. Troutman, who was among the first to make location of mining claims.

Judge Henry Rives of Salt Lake City, John Ryson and C. Lytle of Deer Lodge, are promoting a water system which will be of value to this and the Stateline district. They have secured a group of eight springs in the mountains, near the boundary line, capable of supplying a large volume of water for domestic or other purposes. A conduit will be made to tap all these springs to a common reservoir. The water may then be piped to Deer Lodge, Stateline or to any mine or mill requiring it. The Stateline mining district is six to seven miles east of Deer Lodge, on the opposite side of the mountain range. WASCOTT.

Deer Lodge, March 3.

The Clementina mine, near Good Springs, has been bonded for $50,000.

Mgr. Marx of the Ely M. Co., at Ely, has definitely decided to build a new mill.

NEW MEXICO.

GRANT COUNTY.

It is locally reported that the smelter at Silver City has been sold to the smelter trust and will be shut down. The El Paso smelter output would then be increased from 1000 tons to 1500 tons per day, and the cost of treating the ore from $1.50 to $2 a day.

SANTA FE COUNTY.

The smelter at Cerrillos started on the 13th. The Hardscrabble mine at Magdalena has commenced shipping the 15,000 tons of ore on its dump thereto. There are 400 tons of dry ore at the smelter, the rest being wet ore. The fluxing iron for the dry ore is being shipped from Glorieta.

OREGON.

BAKER COUNTY.

The Ibex mine, near Sumpter, has not been sold to S. W. Ray of Port Arthur, Canada, but has reverted to its original owners. The first payment was made in December, Mr. Ray assuming charge of the property. When the second payment was due, he failed to respond.

The Gem mine, near Sparta, has been sold to Portland men for $10,500.

JACKSON COUNTY.

(Special Correspondence). — Thirty-five

miles north of Medford the Lower Elk Creek mining district is an undeveloped and nearly unprospected region, with plenty red fir timber, good streams and fine climate; country rock, andesite; cutting this are numerous parallel dykes of felsite, in width 5 to 200 feet. These white dykes are well mineralized, a fine-grained variety of iron pyrites being generally disseminated through them, in places concentrating into considerable bodies of irregular shape of a nearly pure sulphuret ore. This carries a little gold, $4 to $6 per ton, but no appreciable quantities of copper or lead.

In a portion of the district a number of the felsite dykes are accompanied by a system of well-defined quartz veins. Some of them possess gouges, polished faces, slickensides, ribbon structure and other evidences of true fissure veins along which more or less faulting has occurred. The ore in these veins is galena and chalcopyrite, carrying a good value in both gold and silver. Although highly refractory, requiring concentration and smelting, two properties have opened up bodies of ore—the Collie Dog and the Bright & Sparkling, adjoining mines on the same vein.

There is one thing of great importance which has to be taken into account in prospecting this district: the ore lies low and shafts have to be sunk to reach it. The amount of chalcopyrite and galena in the veins increases from higher to lower levels, i. e., from the original surface down, until a level is reached on which they are in sufficient quantities to constitute it what may be called the mineral zone—the zone where deposition of copper, lead, gold and silver was most active. Unlike the pyrites disseminated through the felsite dykes, the galena and chalcopyrite in the quartz veins were not derived by lateral secretion from the country rock, but were introduced from below at a great depth and brought up in solution in hot, alkaline waters. Deposition occurred all along the vein, but as the surface was approached it greatly decreased.

The rocks being of early Tertiary age, much newer than the mineral-bearing formations of California, erosion has not cut so deeply into them and the mineral zone is barely exposed in the deeper gulches. The district differs decidedly from any California district, belonging rather to the class of Colorado and Montana deposits. About fifty miles north on this same belt is the Bohemia district, now coming into prominence. So far as I can learn, its geological conditions are similar to this.

Medford, March 10.

SOUTH DAKOTA.

(Special Correspondence).—At the annual meeting of the Detroit & Deadwood G. M. Co. at Detroit, on the 5th inst., the company's name was changed to Detroit & Deadwood M. Co., the scope, purposes and objects of the corporation materially enlarged and the capital stock reduced from $2,000,000 to $1,000,000. The erection of a chemical reduction plant was decided upon.

Detroit, Mich., March 8.

UTAH.

IRON COUNTY.

(Special Correspondence). — Stateline District: Crossing the range from Deer Lodge, Lincoln Co., Nevada, into Iron Co., Utah, the town of Stateline is soon reached. It is favorably located on a level site, near the foot of the mountains, along a ravine where wells of water are obtained. The road from Deer Lodge to Stateline follows along the old Pioche stage line which was so well traveled from '70 to '80. Near the Utah-Nevada boundary line, one and a half miles west of Stateline, Government peak rises to an elevation of about 10,000 feet, on the summit of which a Government signal station was maintained in earlier days. The hills on the east side of the boundary range are higher and the formation more broken than is the case on the Deer Lodge side, but the growth of scrubby timber is about the same. The veins or ledges here trend northerly and southerly as a general thing, though there are one or two well-explored ledges that cut the general formation at right angles. In the north and south veins the gold predominates, but in those trending east and west the most important values are silver.

The country rock of the district consists of porphyry and bird's-eye trachyte. The ledges are usually of good width, though both walls are not always readily found. The gangue rock comprises a hard, tough quartz with streaks of spar and fluorspar, in all of which are gold and silver. The gold in various mines appears to be largely in the free state, though in others it is found in sulphurets. The silver exists in chlorides (horn silver), sulphurets and some in the form of ruby or antimonial silver.

The Johnny mine, which perhaps has attracted more interest than any other property in Stateline district, belongs to the Johnny G. M. & M. Co., of which W. J. Dooly, C. O. Newell, F. M. Wilson, J. J. Brown and Mrs. E. Newell are principal stockholders. The group comprises several claims on the eastern slope of the hill, the development on which consists of a shaft 100 feet deep, with considerable drifting in ore in opposite directions at the 50-foot and 100-foot levels. A short time ago a shipment of twenty-six tons of ore was made to a Salt Lake smelter that brought $5259; also, seventy-five tons from the same shaft were milled at the company's Tremain stamp mill, from which a saving of $1117 was made, and the tailings therefrom, according to tests made, average $12 per ton. In the ore house are ten tons of sorted ore that will average over $500 to the ton, and it is estimated they have 500 tons of marketable ore on the dump. The principal values here are gold, which at present depth is quite free, silver values being in chlorides and native silver. There are, however, some silver and gold in sulphurets and manganese. The ledge of the Johnny trends north and south, but the walls are not reached by present work.

The Ophir is located a mile north of the Johnny and at about 600 feet higher elevation. It was located in 1896 and the ores taken out have practically paid for all development and improvements. An incline shaft sinks 265 feet, following the dip of the vein. Drifts have been run in both directions on the vein at the 45, 100, 150, 200 and 250-foot stations. The vein runs nearly east and west and has a width of from 6 to 10 feet, the material from wall to wall being well mineralized. The values, comprising silver and gold, are carried in white and dark quartz and spar and a little manganese. The silver values are said to run from 100 ozs. to 3100 ozs., the gold running from $2 to $60 to the ton. The silver is in chlorides and sulphurets, the latter form including some gold. There is very little free gold in the Ophir. These ores all contain a high percentage of silica—from 85% to 90%. The Ophir group comprises six claims, which were located by M. Sullivan, who located, developed and sold the Harqua Hala group in Arizona. The Ophir now belongs to Lynch, Lathrop & Effinger. A shipment of forty tons of ore was made which averaged $250 per ton.

The Creole is developed by a 400-foot tunnel, a 40-foot winze, 100 feet of drifting—all on the vein. The ore is a gold-bearing quartz, carrying approximately $14 gold, $3 silver and 90% silica, with some manganese. This belongs to J. J. Knight, McBurney & McDonald.

The Utah Spur, belonging to J. J. Knight, has been exploited some, showing good silver values in a vein structure similar to that of the Ophir.

The Aggie D. is under bond to John Erickson and George Rice, who have a 100-foot shaft and 100 feet of drifting on a vein which is said to be 30 feet wide, in which ores assayed over $18 per ton.

Samples from the June Bug group of five claims ran from $2.40 to $8.60 gold and from 44 ozs. to 87 ozs. silver. The Blackbird, near the Creole, has a 48-foot shaft, the drillings from the work assaying $30 gold and 5 ozs. silver. The Silver Dick, near the Ophir, is also said to make a showing of about 83 ozs. silver and $16 gold. J. C. Muldoon is largely interested in the above various claims.

A. G. Bast and associates of Salt Lake City have a large number of locations in the district on which considerable work has been done, with results that average up with the typical prospects of the camp. There are many locations here on which good indications exist; those mentioned more or less definitely are believed to be a fair illustration of the characteristics of the district. WASCOTT.

Stateline, March 5.

SUMMIT COUNTY.

The Silver King, at Park City, will build an aerial tramway and put in five tanks 60x4 feet.

FOREIGN.

AUSTRALIA.

From Kalgoorlie is reported the almost utter failure of all the enormously expensive sulphide roasting plants erected by the Associated, Lake View Consols and Boulder Main Reef Companies.

BRITISH COLUMBIA.

Rawhiding the ore from the Slocan mines is said to be at a standstill because of a shortage of hides.

MEXICO.

The Esperanza M. Co.'s new mill at El Oro will start up April 1st.

T. L. Davenport has charge of the Candelaria M. Co., at San Pedro, Chihuahua. The company employs 800 men. Its smelter is at Juarez, its reduction works at Chihuahua. The ore carries considerable silver, gold and copper.

Personal.

JAS. D. HAGUE is in Grass Valley, Cal.

GEORGE JOHNSTON has returned to San Francisco from Baker City, Or.

HORACE F. BROWN of Chicago is examining mining property at Sumpter, Or.

CHAS. D. LANE is in San Francisco from Cape Nome, whither he returns in May.

E. ROHLFING, Telluride, Colo., has been appointed Mgr. Red Wing mine, Bingham, Utah.

W. A. PAINE, Pres. Helvetia Mining Co., is visiting the property at Helvetia, Arizona.

CHAS. BUTTERS is operating two mines in San Salvador, but expects to be in San Francisco about June 1st.

GEO. E. BATEMAN, whilom Supt. Black Spider mine, Keswick, Cal., is operating at Big Canyon, El Dorado county, Cal.

CAPT. ARMSTRONG, Mgr. Turner mine, at Sitka, Alaska, is in San Francisco purchasing machinery for his property.

J. T. MCKENNA has returned from Peru and assumed charge of the concentrating mill of the Iron Silver M. Co., Leadville, Colo.

J. HOHISEL, nine years in charge of the Smuggler concentrator, Telluride, Colo., is now Supt. Stark Milling Co., Aspen, Colo.

PRES. LOUIS AUERBACH and Sec. A. N. Winslow of the Boston & Tuolumne G. M. Co. are visiting their mining property in Tuolumne county, Cal.

A. P. FLAGLER of New York, locally supposed to represent capitalists headed by J. D. Rockefeller, is examining the Maryland mine, Grass Valley, Cal.

JNO. W. DIXON has returned to Leadville, Colo., from an inspection of California mill practise, and is about to build a mill for his Little Joe mine, Leadville, Colo.

J. C. WIGGINTON, late Auditor Bimetallic Smelter, Leadville, Colo. now goes as general auditor Woods Investment Co., Victor, Colo. Chas. Hussey succeeds Mr. W. in the Leadville office.

FRED ZEITLER of Nevada county, Cal., Vice-Pres. California State Miners' Association, is in San Francisco and in the absence of Pres. W. C. Ralston, now in Washington, D. C., will occupy the chair at the meeting to-night of the executive committee of the association.

E. H. BENJAMIN, secretary California State Miners' Association, is back in San Francisco from a long and perilous trip to Ungas island, Alaska. On his return the steamer Wolcott, on which he was a passenger, was wrecked and is a total loss in Shelikoff straits, Mr. Benjamin barely escaping with his life to a glacier, from which, with his fellow passengers, after sixty hours' exposure, he got to Uyak, where he remained twenty-four days before rescue by the steamer Excelsior, which brought him to Seattle.

Catalogues Received.

Wood's propeller pump is thoroughly illustrated by sectional drawings and half-tone engravings in a 50-page booklet issued by the general agent, L. G. Harrison, 31 Main St., San Francisco, who will send it upon request anywhere.

"Compressed Air Pumping," catalogue No. 6, of the Rix Engineering & Supply Co., 519 Howard St., San Francisco; half-tone engravings and sectional drawings of air-lift pumps and general treatise on pumping by means of compressed air.

No. 46 of the Fraser & Chalmers series, treating of Riedler air and gas compressors and blowing engines; 140 pages of illustrated description of everything in connection therewith and some technical discussion thereof; a handy volume for any one interested; sent by Fraser & Chalmers, Twelfth and Washtenaw Ave., Chicago.

Coal washing equipments, retarding conveyors, steam coal tipple, elevating-conveying machinery, coal mining machinery, described and illustrated in detail in the usual thorough style of the Jeffrey Mfg. Co., Columbus, Ohio, whose Western office is at 412 Seventeenth St., Denver, Colo.; Eastern office, 41 Dey St., New York City.

"Hydrocarbon Burners, Blow Pipes, Furnaces and Cupel Machines for Chemists and Assayers" is the title of a handy-shaped catalogue or trade treatise issued by the progressive firm of F. W. Braun & Co., 501–505 North Main St., Los Angeles, Cal. The illustrations in this catalogue are above the average; they correctly portray the various devices described and add to the volume's value in the hands of an assayer or chemist. The descriptions of the apparatus are brief, but clear, and are accompanied by easily understood directions for mounting and operating. A specialty is made of hydrocarbon blow-pipe outfits and hydrocarbon burners, the latter claimed to be "the only perfect burner for liquid fuel." These people make an automatic cupel machine, recently illustrated and described in these columns at considerable length, which deserves attention. They are also wholesale suppliers of cyanide of potassium, 98–99%, and will send their handsome descriptive catalogue upon request.

Commercial Paragraphs.

THE Southern Pacific Ry. Co. is installing another 7½ Gates breaker for making ballast. The Gates Iron Works breakers are now in operation on eighty-two railway systems.

THE Navy Department has placed an order with the New York Air Compressor Co., 120 Liberty St., New York, for two duplex compound air compressors of large capacity for the Charlestown Navy Yard, Boston, Mass.

THE Lehigh Valley Coal Co. put in a Cross oil filter on trial about one month ago. They have just ordered nine more. The Burt Mfg. Co. of Akron, Ohio, manufacturers of the Cross filter, say they are breaking all records on business so far this year.

IN the issue of Feb. 24th was mentioned that Jas. Detrick of San Francisco was about to compete with Siberian camel trains and establish a more modern system of freight transportation. This week he has sent two traction engines and eight steel cars to Reval, Eastern Siberia, via New York, Paris and St. Petersburg. Each traction engine is 50 H. P., each car or wagon has a capacity of twelve tons. The trains will be used to freight supplies to the American miners in that section. The traction engines, steel cars and every requisite connected therewith were manufactured by the Daniel Best Manufacturing Co., San Leandro, Cal., who supply all parts of the world with traction engines of a style and economic value that render them of profitable use. With this shipment to Siberia goes one of the Best Mfg. Co.'s machinists to set up and start the train in successful operation.

THE Denver Engineering Works Co., Denver, Colo., have in process of construction two silver-lead furnaces, 45 by 140 inches, for the Germania and Mingo plants of the A. S. & R. Co., at Salt Lake; three of their Standard cold blast matte furnaces, 40 by 176 inches, for the Bingham Copper & Gold M. Co., of Salt Lake; two 25 H. P. electric hoists for the Boston & Montana C. C. & S. Co., of Great Falls, Montana; two 5 H. P. electric hoists for the General Electric Co., of Denver; twelve electric hoists for the Colorado Electric Power Co., at Cripple Creek; the entire crushing machinery for the Globe plant of the A. S. & R. Co., at Denver. They have recently shipped two carloads of sheet-iron hopper work to Taylor & Brunton's new oxide plant at Pallas, Utah; six carloads of high pressure horizontal tubular boilers to the Cochiti G. M. Co., of New Mexico; one of their improved timber framing machines to the Ibex M. Co., Leadville, Colo., and one to the British Columbia Corporation, at Rossland, B. C. They have also shipped four carloads, to British Columbia, comprising two 150 H. P. double drum electric hoists. The third 150 H. P. electric hoist is now complete and ready to ship.

THE Parke & Lacy Co., 21–23 Fremont St., San Francisco, Cal., writing to the San Francisco Chronicle, say: "Referring to the following—'A Kansas City firm recently built and shipped a 30 H. P. gas engine to the Norwegian Copper Works on the island of Trumso, which is on the northern coast of Norway, near the 71st parallel, and almost as far north as the most northern part of Alaska'—which appeared under the heading 'Progress in the Industries' in your issue of March 12th, it has occurred to us that it might be interesting to your readers to know that the gas engine referred to formed a part of a plant sold by our company through our London office, the orders for which were placed through our office here. The plant consisted of a 42″ copper smelting plant complete, included in which was the 30 H. P. gas engine referred to in the article, which was supplied by the Weber Gas & Gasoline Engine Co. of Kansas City. The balance of the plant was supplied by various houses in this country and the whole accumulated at New York and sent forward via London to Norway."

Obituary.

WALTER PRICE, cyanide expert for the Golden Horseshoe mine, Western Australia, died recently from cyanide poisoning, through inhaling the fumes.

A. C. RAND, president of the Rand Drilling Co., New York, and treasurer of the Laflin & Rand Powder Co., died in New York City on the 11th inst., aged 59 years.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING MARCH 6, 1900.

644,843.—MOTOR VEHICLE — A. Bink, Stockton, Cal.
644,729.—SNATCH BLOCK—W. W. Bouse, Aberdeen, Wash.
644,730.—WHEEL HUB—S. Colt, Santa Barbara, Cal.
644,731.—VEHICLE TIRE — R. Cousins, S. F.
644,741.—OIL GAS VALVE—S. Guthrie, S. F.
644,770.—LEACHING ORES—R. W. Kennedy, Ashland, Or.
644,614.—LAND SCRAPER—G. M. Light, Pomeroy, Wash.
644,675.—ROPE TRAMWAY—J. T. Ludlow, S. F.
645,040.—PIE RACK—W. H. Mayo, Los Angeles, Cal.
644,775.—CHEESE CUTTER — Nagley & Asbery, Marysville, Wash.
644,935.—REFRIGERATOR—J. Nash, Dayton, Wash.
644,869.—WAVE POWER — W. Newell, S. F.
644,680.—TELEPHONE GUARD — L. B. Ordway, S. F.
644,723.—LIFE BOAT—W. S. Ray, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ELASTIC TREAD HORSESHOE.—C. Y. DeLay, Murphy, Cal. No. 644,284. Dated Feb. 27, 1900. This invention relates to an attachment for metallic shoes by which an elastic bearing is provided for the horse's foot, and a means for removably securing the same. It comprises a tongue and grooved bar of rubber, and a correspondingly channelled metallic shoe so constructed that the elastic bar may be introduced or removed in such a manner that it is practically locked in place for use. The rubber bar is slipped into the groove or channel in the lower part of the shoe and pushed around a curve of the shoe, so that the outer face or tread covers the flanges of the shoe, and provides a perfect rubber tread. The shoes themselves are provided with nail holes so disposed that they can easily be fastened upon the animal's foot.

CONCENTRATOR.—George Gates, Jackson, Cal. No. 644,289. Dated Feb. 27, 1900. This invention relates to improvements in endless traveling belt concentrators, in which the belt passes over drums at opposite ends of the frame, so that its upper surface stands at an incline from one drum to the other, with means by which the belt is caused to move slowly from the lower toward the upper end, having devices by which the pulp mixed with water is delivered upon the belt so that with the movement and travel of the belt and the action of the water, the lighter valueless portions are washed off over the lower end, and the heavier material will be gradually concentrated and carried up over the upper end of the belt and delivered into a wash and collecting tank. A trough is arranged transversely above the belt for distributing the pulp and water which is received into it by means of divergent channels and these delivered into a series of parallel troughs extending transversely above the belt, and so arranged that pulp will overflow from one trough to the next. These troughs are perforated with holes through which the pulp will fall upon the belt at different points in the length thereof, depending on the gravity of the pulp which is being fed.

LOCK.—J. C. Meyer, San Francisco, Cal. No. 644,255. Dated Feb. 27, 1900. This invention relates to improvements in door locks, and is designed to provide an improved means for operating the latch by which the door is held in a closed position. In this lock there is a slidable spring-pressed latching bolt having rearwardly extending parallel bars, a frame fixed between said bars and toggle levers having the front ends pivoted to the stationary frame. A pin projects through slots in the rear portion of the frame and connects with the parallel bars of the slidable latch. The transverse angles of the toggle levers are united by pivots so that they project through the lock plate, and hollow knob shanks are fixed upon opposite sides of the door in line with the projecting lever angles. Spring-pressed push buttons are slidable in the outer ends of the knob shanks and pins projecting with said buttons extend inwardly through guiding tubes so as to contact with the transverse angles of the toggle levers, so that pressure upon the push buttons acts to compress the levers transversely and extend them in line of movement of the latch and thus withdraw the latch. When the buttons are released the latch will be returned to its normal position by any suitable spring.

NAILS.—J. T. Eyster, Eagleville, Cal. No. 644,286. Dated Feb. 27, 1900. This invention is designed to improve nails for fastening timber and other articles together, and its object is to provide a means for securely locking nails of all descriptions when they have been driven—such a formation of the entering point as will insure the cutting of the fibres of the wood to form a channel into which the spiral of the nail passes, and to lessen the danger of splitting the wood by the driving of such a nail. The upper part of the



shank of the nail is cylindrical, the lower part is flattened and twisted into a spiral form as shown in the accompanying cut. The front edge of the spiral is beveled to an edge, while the rear is square without bevel to give increased strength at that point. The nail has a rounded point, the edges of which are beveled, one of the edges merging into the beveled front edge of the spiral body and forming a continuation thereof. This construction causes the nail to turn about its axis as it is driven, and when once seated it is firmly held in place, and not liable to be withdrawn.

OIL GAS VALVE AND APPARATUS.—Samuel Guthrie, San Francisco, Cal. No. 644,741. Dated March 6, 1900. This invention relates to an apparatus for continuously feeding oil to the retorts or channels of gas-making apparatus, and a valve by which the feed may be regulated and maintained at a constant flow. It consists of a pipe tapering from and returning to the tank, a pump by which a continuous circulation of liquid within the pipe is produced, and means for regulating the pressure within the pipe, together with valve or cock through which the liquid is delivered under pressure, this valve having a rectangular or diamond-shaped port, and a correspondingly shaped passage over which it is adjustable. There is a by-pass pipe connected with the main pipe upon each side of a cock which controls the flow and regulates the pressure.

Recently Declared Mining Dividends.

Elkton, Colorado, $33,750	March 20
Amazon, Colorado, $30,000	March 15
Silver King, Utah, $75,000	March 10
Portland, Colorado, $60,000	March 15
Swansea, Utah, $5000	March 15
Daly-West, Utah, $37,500	March 15
Grand Gulch, Utah, $2400	March 15
Isabella, Colorado, $67,500	March 24

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: **EDWARD N. BREITUNG,** MARQUETTE, MICH.

Quicksilver

—FOR SALE BY—

The Eureka Company, OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

M. S. HAUSER,

Room 39, 3 California St., San Francisco, Cal.

Will act as purchasing agent for mining companies.
Will use the benefit of his wide experience in getting the best articles at the lowest prices, securing low freight rates, and prompt delivery.
Will submit estimates on all kinds of supplies.
Will work for either a small salary or a commission, and show a saving greatly in excess of charges.

Latest Market Reports.

SAN FRANCISCO, March 15, 1900.

SILVER—Per oz., Troy: London, 27⅛d (standard ounce, 925 fine); New York, bar silver, 59¾ cts. (1000 fine); San Francisco, 59⅜; Mexican dollars, 48⅜c.

COPPER.—New York: Lake, 1 to 3 casks, 16.75 cash; carload lots, 16¼; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.00; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17½@18. Mill copper plates, 21½c; bars, 23½@25c.

LEAD.—New York, $4.72; St. Louis, $4.72; San Francisco, $4.88; pipe 7½, sheet 8¾, bar 6½c. London, Soft Spanish Lead, £16 15s=4.82c per lb.

SPELTER. — New York, $4.60; St. Louis, $4.60; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 22½c; San Francisco, Plumbers', 100-lb. lots, 19c.

IRON. — Pittsburg, American soft—pig—large lots—$25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c. President Lambert of the American Steel & Wire Co. has a cable from the company's London office confirming the report that the steel and iron mongers of Germany have contracted in England for the entire output of pig iron in Great Britain for the year 1901 at $26@27 a ton. President Lambert says: "This means higher prices for pig iron, of course. I should not be surprised to see Bessemer pig selling at $5 above present prices by the first of April. England has sold a year's output to Germany. That means we will have to supply England's needs. She will buy from 800,000 to 1,000,000 tons from America to meet the deficiency."

STEEL.—San Francisco, bar, 12c to 20c per lb.

QUICKSILVER. — New York, $51.50; London, £9 15s; San Francisco, local, $51.50 ℔ flask of 76½ lbs.; export, $47.50.

PLATINUM.— San Francisco, crude, $16 ℔ oz.; manufactured, $19.50@22.00

FERRO-MANGANESE. — San Francisco, ℔ ton, $30.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

TIN.—New York, pig, $33; San Francisco, ton lots, 36c; 1000 lbs., 36½c; 500 lbs., 37c; less, 38c; bar tin, ℔ lb, 41½c.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ℔ set; 14 oz., 40s., 11c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

OILS.—Linseed, strictly pure, boiled, bbl., 68c; cs., 73c; raw, bbl., 66c; cs., 71c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 47½c; cs., 52½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 40c to 50c.

NICKEL.—New York, 40@45c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.80 50-lb lots; San Francisco, $2.50 to $3 lb lots.

FERRO-TUNGSTEN.—New York, 60c; San Francisco, 75c (60%).

MAGNESIUM.—New York, $3.50 ℔ lb.; San Francisco, $4.50.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs, $10.05; Colorado Anthracite, $14.50.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 33@35c ℔ lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, 1¾c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¼@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

San Francisco Stock Board Sales.

SAN FRANCISCO, March 15, 1900.

9:30 A. M. SESSION.

200 B. & B.....38c	100 Y Jacket....19c
700 Caledonia..$1 25	100 H. & N.....30c
300 Chollar.....22c	300 Mexican.....27c
100 C. C. & V.$1 60	500 Ophir.....79c
100 Confidence..80c	100 Overman....33c
100 Crown P't...14c	100.....34c
200 Sierra Nev...56c	500.....32c
100 Utah.....10c	200 Savage.....14c

2:30 P. M. SESSION.

150 C. C. & V.$1 55	100 Silver Hill...08c
200 Belcher.....31c	100 Challenge...24c
550 Overman....33c	100 New York...04c
100 Caledonia..$1 20	50 Overman....33c

SITUATIONS WANTED.

By a Practical Miner who is thorough and up to date in working a mine. Can handle men to advantage. Understands milling, concentrating and the erection of all kinds of mining and milling machinery. With some years of experience. Will accept a position to manage a mine or mill. First-class testimonials furnished as to abilities, integrity, etc. Address QUARTZ, care Mining and Scientific Press.

MEXICO.—A thorough, all-round mining and mill man wants position in charge of mill or mine. Many years' experience in Spanish countries, language and laws Very best of references. Address H. C. T., 413-415 Golden Gate Avenue, S. F.

Wanted—A Position as Superintendent in a hydraulic mine by a miner who has had twenty years' experience. Best of references as to ability, honesty and sobriety. Address S. O. G., care of Mining and Scientific Press.

Metallurgist and Chemist, technical graduate, fifteen years' practical experience in Mexico and the United States, familiar with the treatment of gold, silver, copper and lead ores, desires engagement. Address METALLURGIST, this office.

WANTED—By an engineer posted in mining and milling, a position as superintendent or manager. Am prepared to plan, erect and operate economically precious metal mills. Sober, reliable. Address W. G., Mining and Scientific Press.

Mining and Metallurgical ENGINEER

DESIRES POSITION.

Had long experiences in gold and silver mines and reduction plants. Had charge of stamp mills and cyanide plants. Can furnish best of references. Address CYANIDE, care this office.

WANTED.

Wanted—Gasoline Engineer,

One who is a machinist preferred. Applicants state references and salary expected. Address M. M., care of this journal.

WANTED.

A First-Class Diamond Drill Man to Set Bits.

Address THE MOUNTAIN COPPER COMPANY, LTD., Keswick, Shasta Co., Cal.

WANTED.—A Second-Hand White Howell Roaster, also a Revolving Drier.

Must be in good repair. Address ARTHUR HENDEY, Agent, Copper Chief Mining Company, Jerome, Arizona.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from George H. Hedrick, in the Hedrick Gravel Mine, near San Andreas, Calaveras Co., to deposit tailings on a flat below the mine; from Wm. Weyman, in the Weyman Placer Mine, near Placerville, El Dorado Co., to deposit tailings in a reservoir below the mine; from Hugh H. Crain, in the Pigeon Creek Mine, near Plymouth, Amador Co., to deposit tailings in Indian Creek; from Henry Meyer, in the Greenhorn Mine, at Cherokee, Nevada Co., to deposit tailings in Shady Creek; and from the Emery Gold Mining Company, in the Emery Hydraulic Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in Adobe Gulch, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on April 2, 1900, at 1:30 P. M.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

10 H. P. Gasoline Hoist for Sale.

Complete outfit in good condition. Price low. Address PAUL J. PITNER, Placerville, Cal.

Experienced Mining Engineer (age 40) reports on mines and their economical development; ore dressing; processes; mining machinery and mill construction. References. P. O. Box 971, Denver, Colorado.

FOR SALE.

FOR SALE.—DIVIDEND-PAYING, HYDRAULIC placer. Extensive deposits. Old channel gravel, water, pressure, grade, dump, and gold. Rigid investigation invited. Thoroughly legitimate. Banking references. Owner. IDAHO, care of Mining and Scientific Press.

Mines for Sale.

A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.

H. B. RUNKLE, Mining Broker, El Paso, Texas.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalocknecht, Durango, Mexico.

A BARGAIN.

3500 feet of 16-inch, 5 B. W. G. National Tube Works seamless pipe. Kimberly joints. Immediate delivery.

Address P I P I, Room No. 140, No. 32 Broadway, New York City.

STEEL RAILS FOR SALE.

400 Tons 40-lb Relaying T Rails with Plates. One 30-Ton Saddle Tank Standard Gauge Locomotive, f. o. b. San Diego, Redondo, or San Pedro, Cal. Correspondence solicited.

C. J. TALLON,
308 Market Street, San Francisco, Cal.



FOR SALE.
Relaying Rails
For Mines and Street Railways.
LEE CHAMBERLAIN & CO.,
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LOS ANGELES.

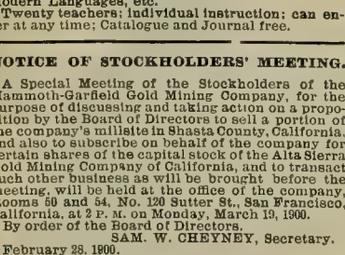
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MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.
ELECTRICAL DEPARTMENT: Theory and Practice; Construction,
BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.
Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

NOTICE OF STOCKHOLDERS' MEETING.

A Special Meeting of the Stockholders of the Mammoth-Garfield Gold Mining Company, for the purpose of discussing and taking action on a proposition by the Board of Directors to sell a portion of the company's millsite in Shasta County, California, and also to subscribe on behalf of the company for certain shares of the capital stock of the Alta Sierra Gold Mining Company of California, and to transact such other business as will be brought before the meeting, will be held at the office of the company, Rooms 50 and 54, No. 120 Sutter St., San Francisco, California, at 2 P. M. on Monday, March 19, 1900.
By order of the Board of Directors.
SAM. W. CHEYNEY, Secretary.
February 28, 1900.



WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

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STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
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Jena Normal Glass,

THE BEST LABORATORY WARE MADE.

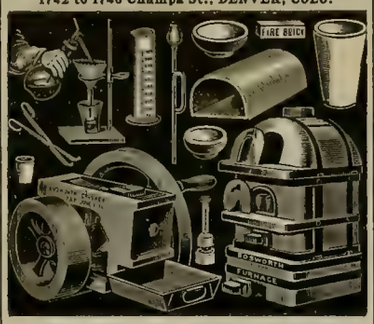
Everything necessary for the
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will be furnished of best quality at *reasonable prices.*

UNEXCELLED BALANCES, WEIGHTS AND PLATINUM.

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Manufacturers, Importers and Dealers in **Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.**
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

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THE ROESSLER & HASSLACHER CHEMICAL COMPANY NEW YORK CHEMISTS

CYANIDE
Peroxide of Sodium
Hyposulphite of Soda
Chloride of Lime
Sulphide of Iron
And Other Chemicals for Mining Purposes.



Mining Screens
A SPECIALTY.
Diagonal Slot,
Straight " "
Burred " "
Round Holes.
In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.



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SAN FRANCISCO
Pioneer Screen Works,
JOHN W. QUICK, Prop.
Improved Facilities! Finest Work! Lowest Prices!
Perforated Sheet Metals, Steel, Russia Iron, American Planish Zinc, Copper and Brass Screens for All Uses.
MINING SCREENS A SPECIALTY.
221 and 223 First Street, San Francisco, Cal.

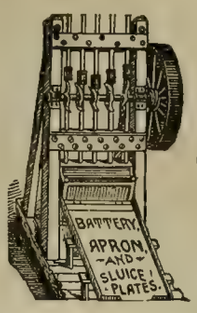


A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F.

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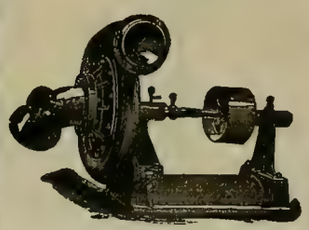
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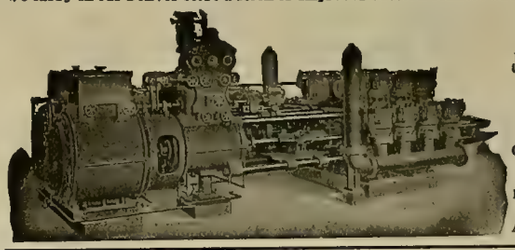
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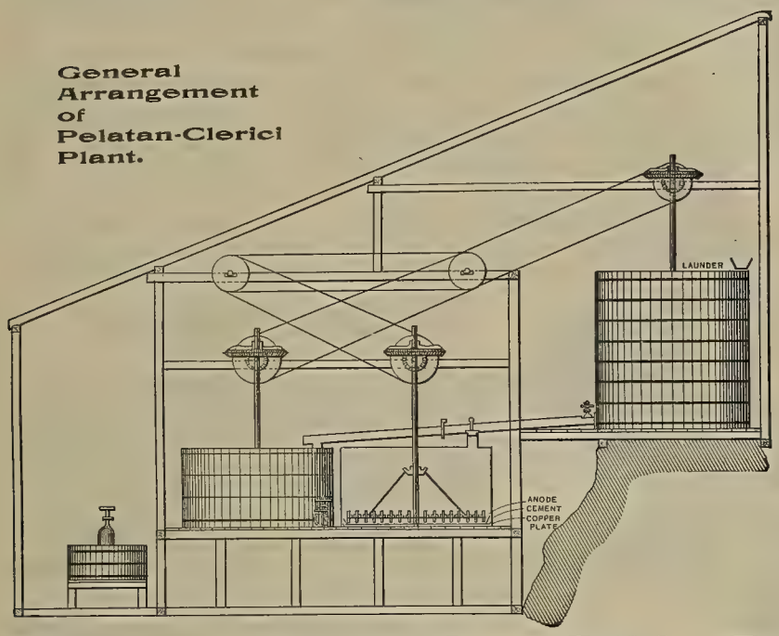
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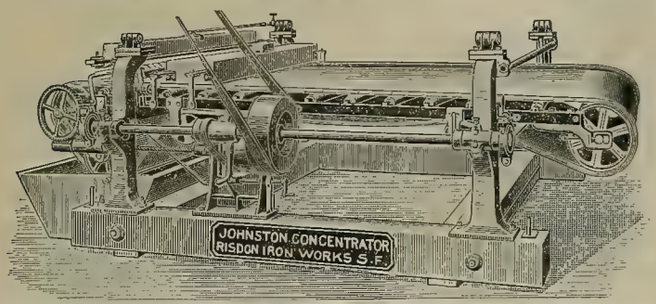
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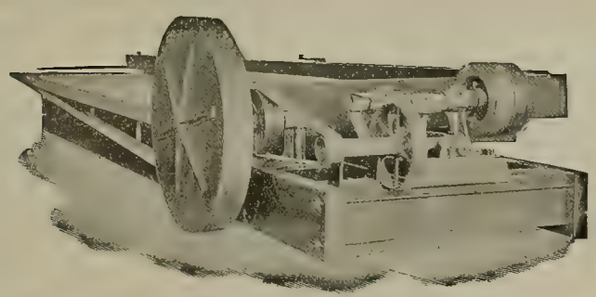
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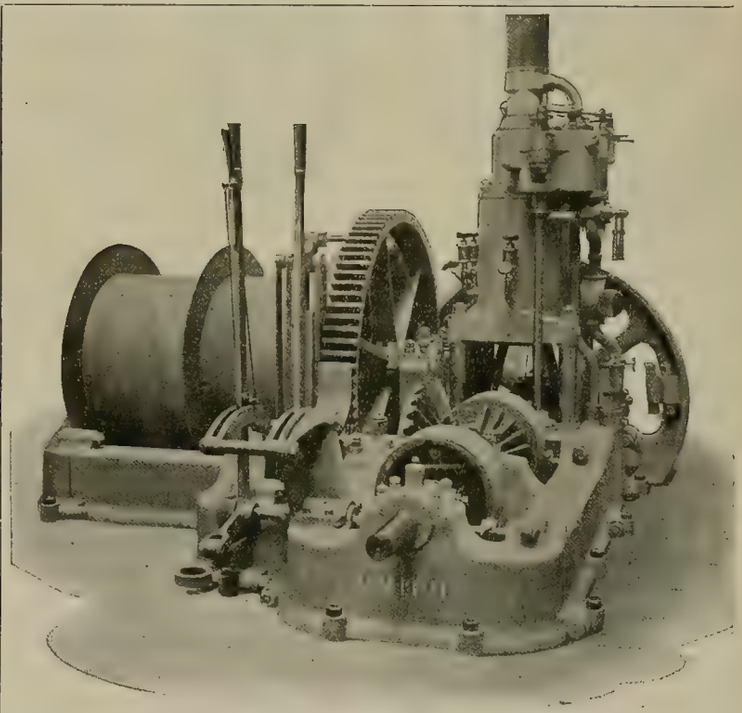
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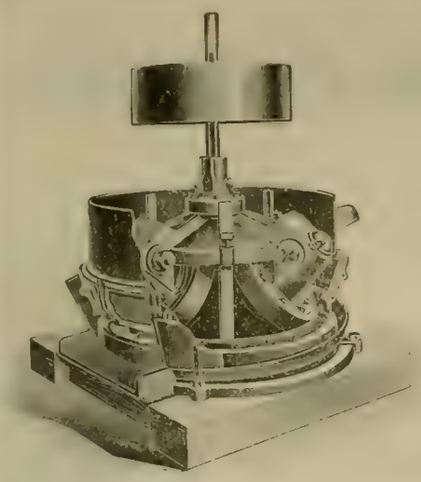
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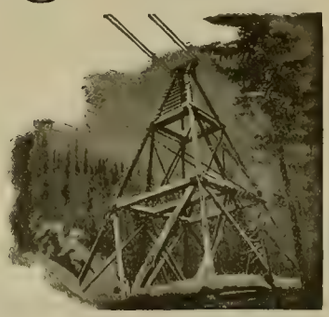
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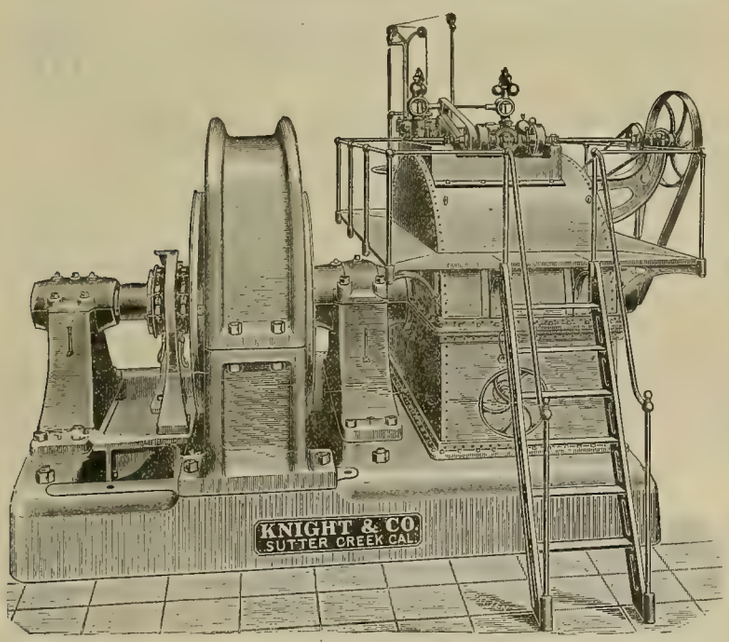
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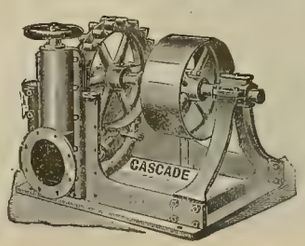
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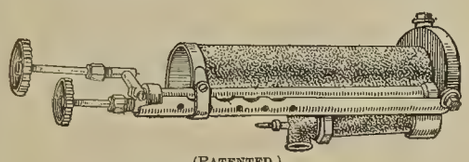
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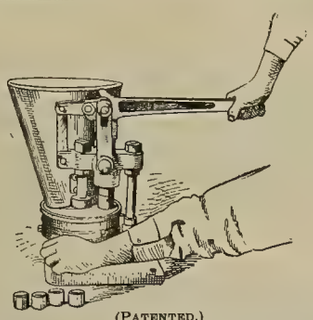
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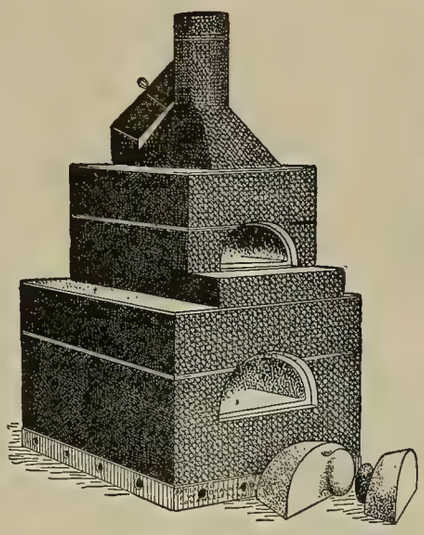
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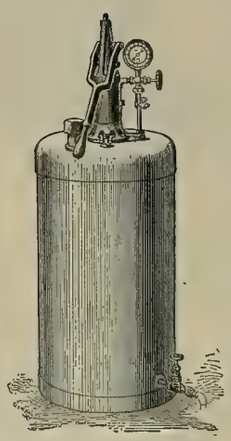
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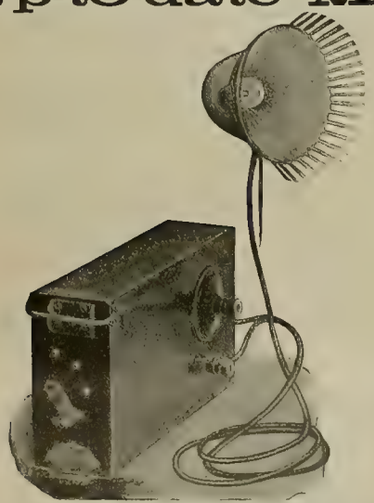
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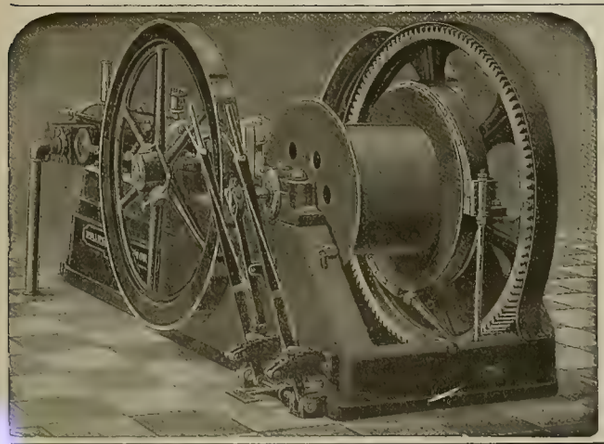
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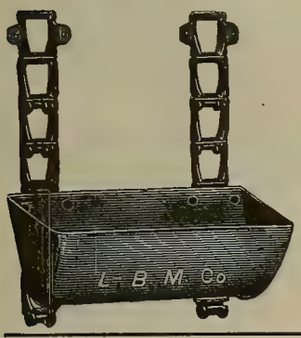


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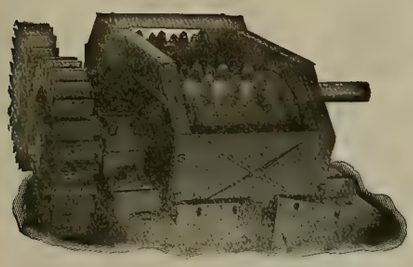
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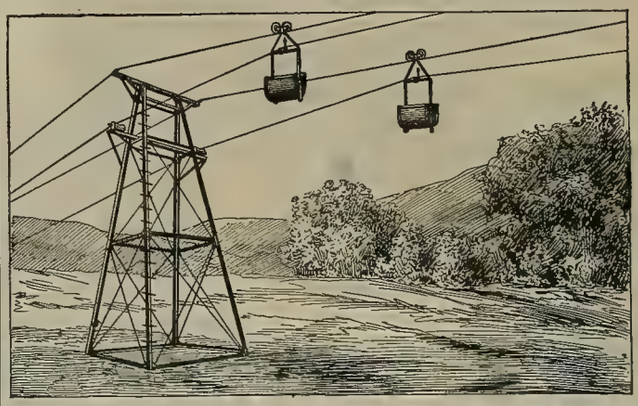
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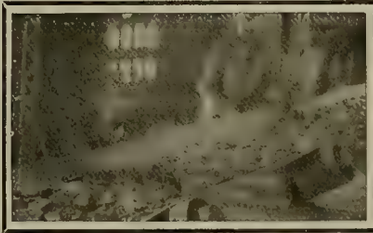
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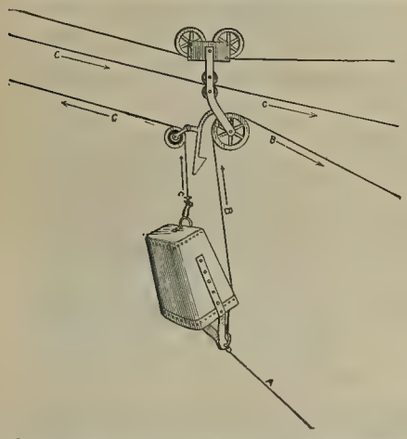
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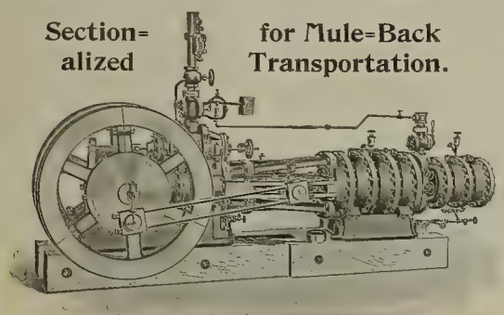
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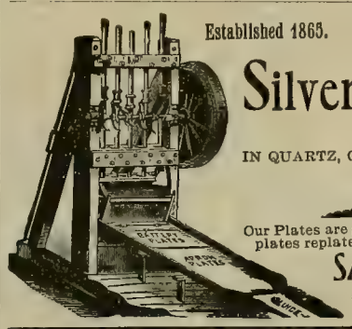
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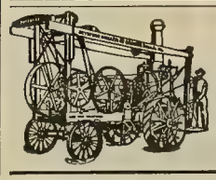
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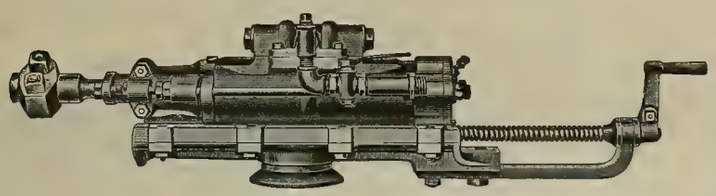
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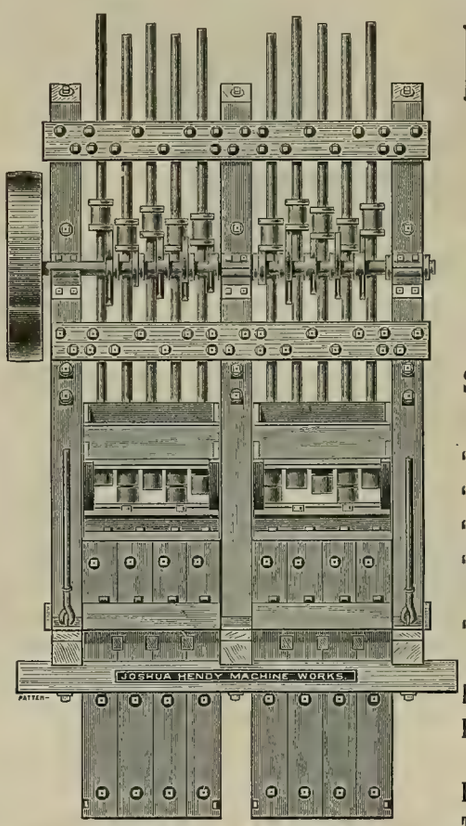
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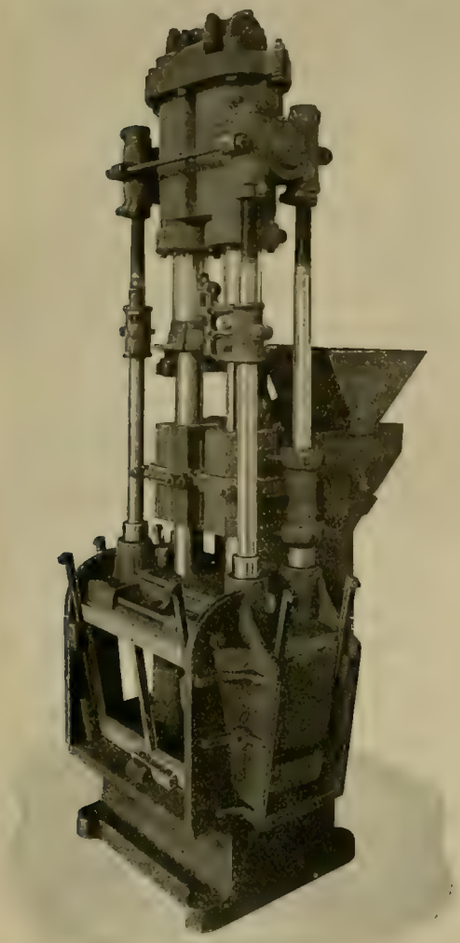
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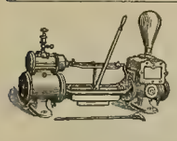


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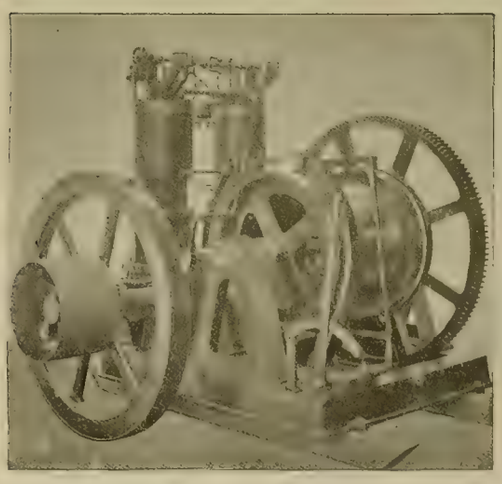
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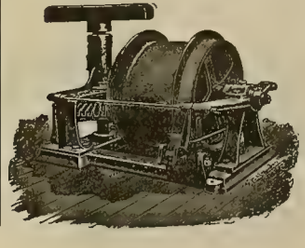
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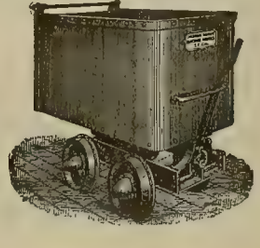
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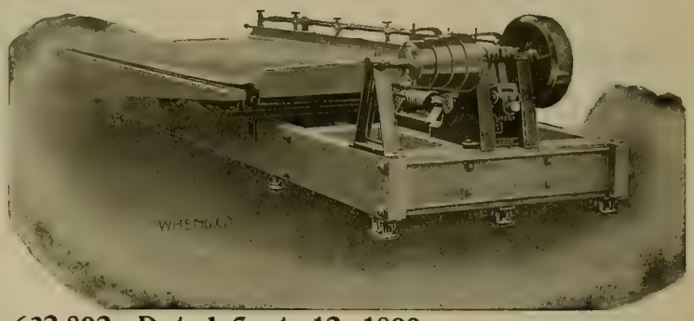
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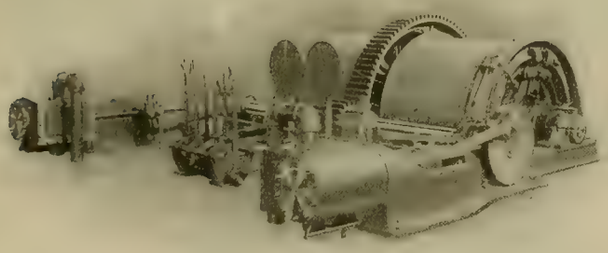


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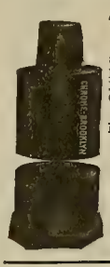
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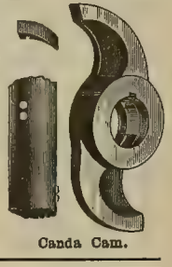
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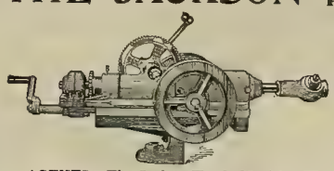
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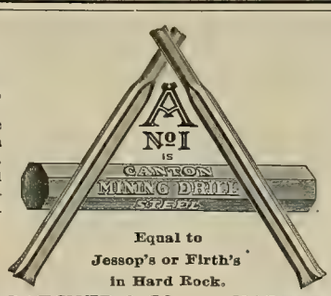
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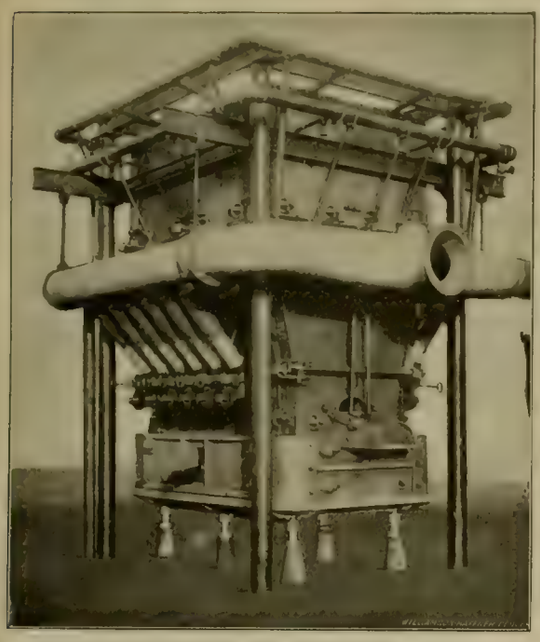
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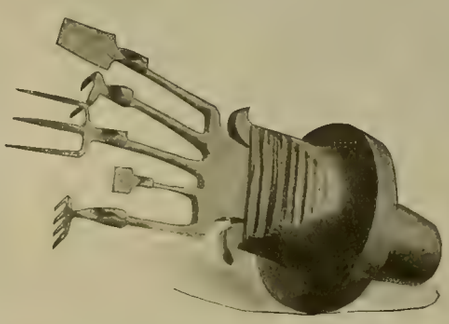
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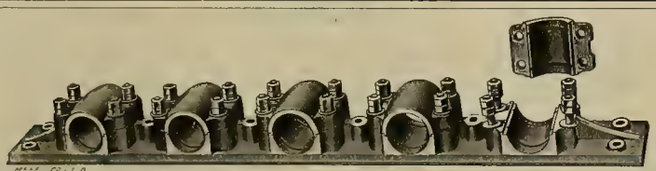
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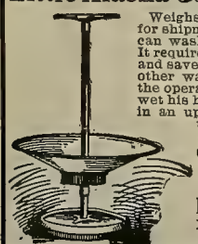
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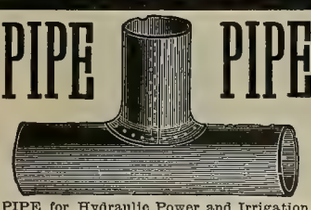


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Notice.—There are delinquent upon the following described stock, on account of assessment (No. 22) levied on the 25th day of January, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
P. A. Wagner, Trustee	90	980	29 40
P. A. Wagner, Trustee	92	1,000	30 00
P. A. Wagner, Trustee	93	1,000	30 00

And in accordance with law, and an order of the Board of Directors, made on the 25th day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 19th day of March, 1900, at the hour of 2 o'clock P. M. of said day, to pay delinquent assessments thereon, together with costs of advertising and expenses of the sale.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

DELINQUENT SALE NOTICE.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of January, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Geo. H. Bradford	14	85	$170 00
Isaac W. Bradford	48	3	6 00
Clark C. Bradford	40	13	26 00
Annie M. Bradford	41	10	20 00
Geo. H. Bradford	59	80	160 00
H. P. Cartier	67	5	10 00
Geo. H. Bradford	91	115	230 00
Geo. H. Folsom	101	20	40 00
Geo. H. Folsom	102	20	40 00
Geo. H. Folsom	103	20	40 00
Geo. H. Folsom	104	20	40 00
Luther J. Holton, Trustee	105	5	10 00
Luther J. Holton, Trustee	107	10	20 00
F. E. Densmore	108	25	50 00

And in accordance with law, and an order from the Board of Directors, made on the 26th day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, No. 310 Pine street, rooms 36 and 37, San Francisco, California, on MONDAY, the 2nd day of April, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

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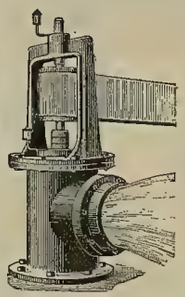
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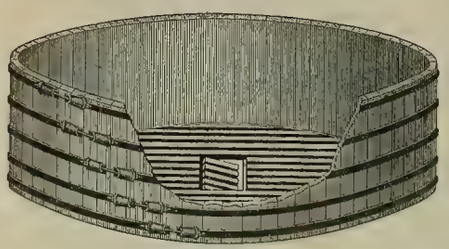
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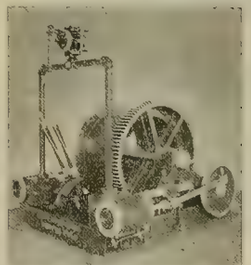


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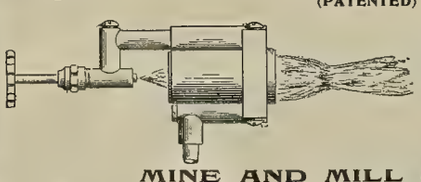
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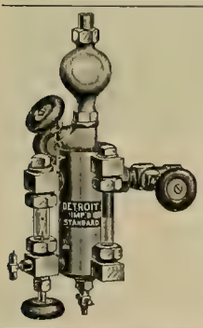
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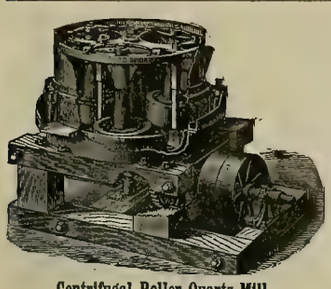
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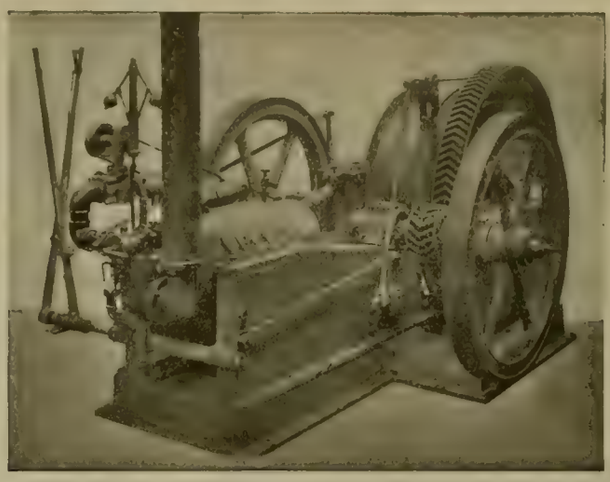
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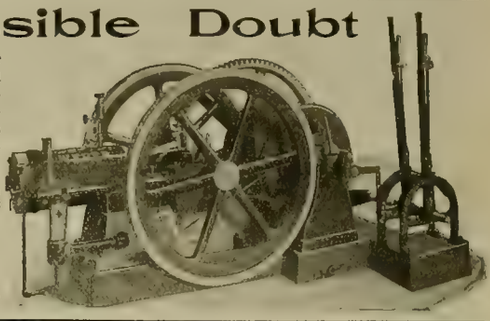
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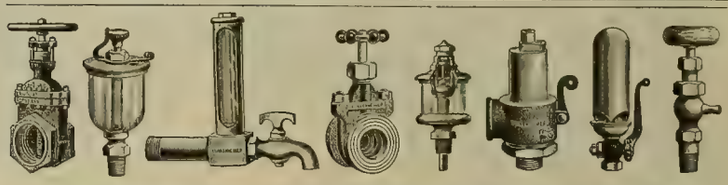
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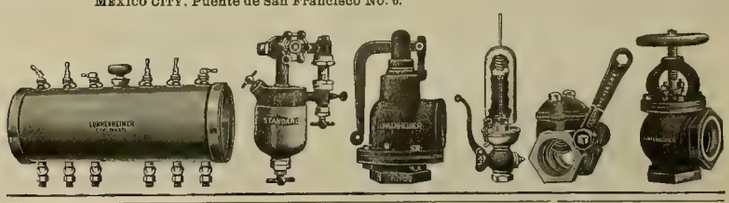


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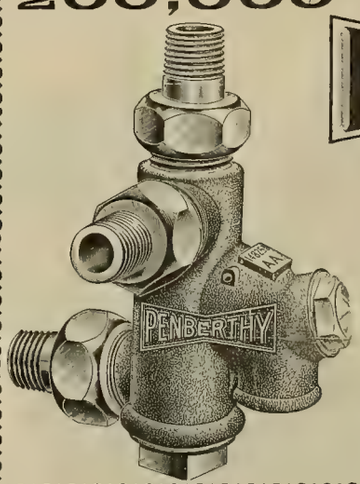
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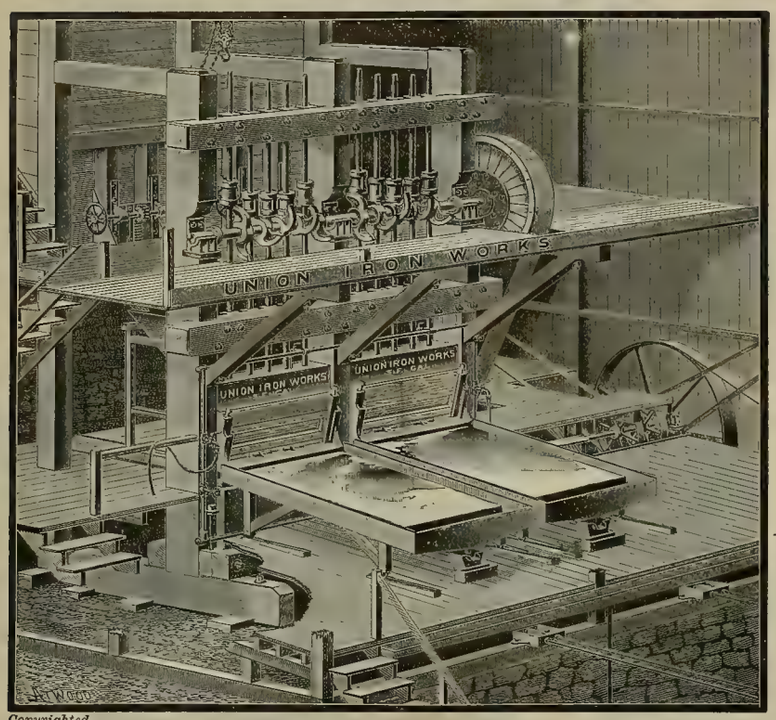
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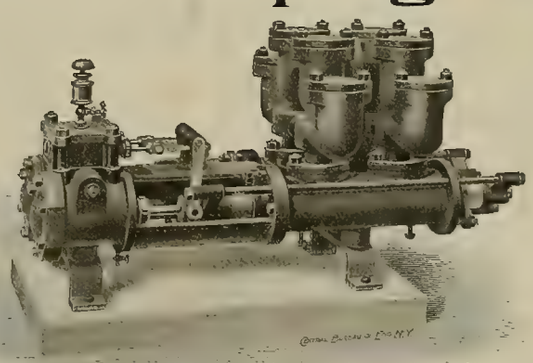
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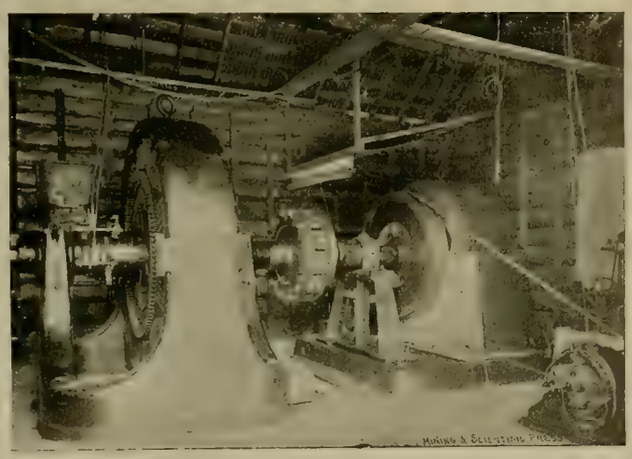


Fig. 2.—400 K. W. Westinghouse Alternating Current Generator, Bed Rock Dredging Co. (See page 317.)



Fig. 1.—Pipe Line to Power House, Bed Rock Dredging Co.

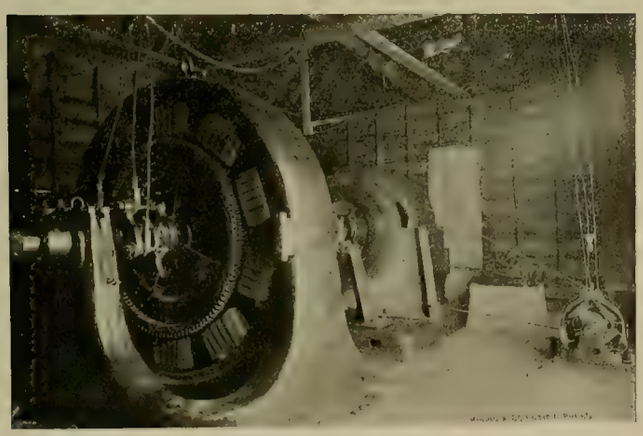


Fig. 3.—400 K. W. Westinghouse Alternating Current Generator, Bed Rock Dredging Co. (See page 317.)



Fig. 4.—Interior of Power House with Westinghouse Transformers, Bed Rock Dredging Co.



Little Soda Lake, Nevada.

(See page 320.)



Soda Lake, Nevada.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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J. F. HALLORAN.....Publisher.

San Francisco, March 24, 1900.

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Some Deserved Criticism.

There is a publication at Colorado Springs, Colo.—The Mining Investor—devoted mostly to investors and speculators, that seems to have sufficient understanding to note the misleading speciousness of some mining prospectuses and sufficient nerve to correctly comment thereon. To the unheeding or unknowing reader, some of the statements in some mining prospectuses seem to say a good deal honestly favorable to the mining schemes of which they treat; while, in reality, what is said may be a cunningly contrived collection of words with the appearance of candor or intent to furnish information, but actually misleading or couched in phrases intended to be misunderstood. In the current issue of the Mining Investor, a prospectus of a property in Ward, Boulder Co., Colo., is analyzed. This prospectus—of the Timberline Mines Company—is no better nor worse than dozens of similar propositions, but the same standard of criticism that the Investor measures it by is applicable to that general class. The prospectus discussed is taken up piece by piece, and its entire lack of exactness is shown: its accuracy is disputed, its ambiguity pointed out, its evasion made manifest, and, in general, the untrustworthiness of its statements clearly demonstrated.

"In the Dew Drop mine alone millions of ore are already blocked out. The work of opening the Adit, the Ni Wot and Columbia is going forward every day. A year will see this work so far completed that other millions will be in sight." What are these "millions of ore" and these "other millions." Is this a trick or insufficient explanation? Millions of what? Millions of atoms, millions of tons of country rock, millions of tons of ore, or millions of dollars' worth of gold? The last, I presume, is what we are supposed to take it for, but why not say so? We might take it for millions of dollars now and then be called fools for doing so later on, because it did not actually say so. * * * What has been going on all these years that the Big Five companies have been operating? We are told that 10,000 tons of ore have been treated in the mill. What has been the result? Has it been good? Is it reasonable to suppose that Mr. Merrill would have forgotten to say anything about it if success had been attained? * * *

I object to an illustration such as is contained on the second page, which is supposed to be a section of the mountain with the Adit tunnel running through it. From the tunnel level to the surface, a distance of about 2000 feet, the illustration is marked "ore, ore;" it is colored in gold and the illustration is labeled "A Wedge of Gold." This, surely, is of a misleading nature, as also are the figures showing the possible millions of tons of ore in sight, although the whole thing is cleverly handled in a way that Mr. Merrill might shield himself by saying "I never said so."

That is just the point. The Eastern clerks, tailors, domestics, teachers, clergymen, etc., who read such meretricious prospectuses don't know anything about those things; they read unwittingly, and think it certainly must be good, it sounds all right; and so buy stock. Any one knowing anything of mining would only laugh at such absurd generalities, that really say nothing, but imply a good deal; and yet the prospectus in its entirety may assert (where it it does positively assert) nothing that is not true or capable of demonstration. Any mining man or experienced investor reading the prospectus in question would see that all it really said was "buy this stock; you can't lose much and may win something:" but it is in the covering up of this in glittering language and twisting the facts to make things appear what they are not that the fault lies.

The article referred to contains about 2000 words, and in it its author has done some real good to the mining interests of Colorado. In the long run it hurts a section or a State to fool any one—to get money under false pretenses—and there is so much of surpassing merit in legitimate mining enterprises in Colorado that it is well not to constantly allow to pass unchallenged the reckless juggling with truth and confidence that so often appears in mining prospectuses.

A Profitable Investment.

It is gratifyingly customary to get many kindly comments from subscribers and readers of this paper everywhere that mining is carried on, but of late the number increases. Particularly noticeable is the favor with which original articles written by practical men are received. It has long been the province and purpose of this paper, and it continues to be its pleasure and privilege, to weekly publish more original matter of interest to mining men than any other journal published anywhere. While not ignoring the severely scientific or coldly technical requirements of the profession, it is manifestly of value and interest to all to read the practical experience of men who themselves do every day that about which they write. What is more or better expert testimony than the statement of his work, its method and result by the man who is doing that work successfully right along!

Running through the pages of the past few months is noted a number of such articles, technical, exact and accurate in detail, furnished by miners, many of them past grand masters in the art and science of their calling, specially written for this paper, the favorite and recognized medium of exchange for such information among progressive metal miners. The list of titles exemplifies the practical and valuable character of such articles. Among them are noted articles on "Types of Head Frames," "Characteristic Mines of the California Gold Belt," "How Low-Grade Ores Pay," "Gold Precipitation by Zinc Dust," "Selection of a Mill Site," "Metamorphism of Rocks," "Concentration of Auriferous Sulphides in California," "Increasing Mill Capacity," "Charcoal in the Cyanide Process," "Advantages of Sorting Ore," "Methods of Working Cyanide Plants," "Concentration of Ores," "Cyaniding Prior to Amalgamation," "Temperature of Battery Water," "Genesis of Ore Deposits," "Prehistoric Rivers in California," "Mine Surface Sampling," "Copper Tubes and Sheets Direct from Solutions," "Cheap Mining and Milling," "The Emerson Shaft of the Wildman Mine, Sutter Creek, Cal.," "Motive Power for Mines," "Factors of Success in Mining," "California Drift Mining," "Walls of Mineral Veins," "Phenomena Attending the Accumulation of Bitumen," "The Caving System of Mining," "Blasting by Electricity," "Co-operative Milling," "Ore Shoots and Ore Chimneys," "Chemical Features of Gold," "Laccolites and Their Relation to Ore Deposits," "System of Mine Signaling," "Status of Alien Locators of Mineral Lands," "Notes on Ore Dressing," "Construction of an Upraise," "Quicksilver Recovery from Greasy Refuse," "The Switzerland of Colorado," "Bookkeeping for Mines," "Community Telephone Exchanges," "Gas Engines for Power and Pumping," "As to Selling a Mine," "On the Concentration of Ores by the Use of Water," "Dredging for Gold," "The Formation of Coal," "Clays, Commercially Considered," "Buying Mining Machinery," "Gold Mining and Milling in Georgia," "High Mining in Colorado," "Wireless Telegraphy Without a Coherer," "Bullion at U. S. Mints and Assay Offices," "Mine Values," "The Occurrence of Gold," "Outcrops and Croppings," "Of Interest to Owners of Refractory ore," "Method of Handling Timbers," "Tunneling Record at De Lamar, Idaho," "Notes on Handling Dynamite," "Gold Mining in California's High Sierras," "Pacific Coast Iron and Steel Manufacture," "Silver-Plating of Amalgam Plates for Gold Mills," "That Deadly Gas," "Cyanide Plant at El Dorado Canyon, Nevada," "Self-Righting Mine Skip," "Masonry Dams and Retaining Walls," "General Formula for Ore Fluxing," "Favorable Smelter Locations," "Some Sample Inquiries and Their Answers," "New Device for the Surveying Engineer," "A Door Closed to Miners," "Some Notes on Gold Dredging," "Something New in Engineering," "The California Copper Co.'s New Plant," "Hydraulic Mining in California," "Mining and Scientific Education," "A Standard Ohm," "Treating Amalgam and Retorting," "Wet Crushing and Cyaniding Siliceous Ores of the Black Hills," "Details of Cost of One Year's War Eagle's Mine Operations," "Proper Testing of Gold Dredging Ground." That is but a partial list of the original articles so appearing in this paper in the past weeks. The list shows how valuable to any miner is such a paper. Any one of the seventy-nine specified is considered worth the small amount charged for an entire year's subscription of fifty-two such issues. An annual subscription thereto is about as profitable investment as can be suggested. Many of these articles, when received in manuscript, were accompanied by sketches, photographs, etc. The sketches were redrawn to scale, the photos suitably engraved, and the illustrations accompanying the published articles made them all the more interesting. The question for any real miner who wants to keep up with the march of mining progress is not "Can I afford it?" but "Can I afford to be without it?"

Profitable Mining of Low Grade Ore.

Mention was made in the issue of the 10th inst. of $2 ore being mined and milled at a profit; and in answer to a question as to where, in the issue of the 17th, were cited some instances. Among those mentioned was the Atlantic mine at Houghton, Mich. During the week has come a copy of the annual report of that mine, in which occurs the following paragraph:

The low yield of the rock, which was noted in our last report, continued during the first seven months of the year, reaching the lowest point in the history of the mine, or an average of $11\frac{58}{100}$ pounds of copper per ton of rock stamped. A change for the better then began, and the yield improved gradually, giving an average for the last five months of the year of $13\frac{28}{100}$ pounds per ton, and for the entire year an average yield of $12\frac{28}{100}$ pounds per ton.

It is to be noted that the official report of the company fully bears out the previous editorial statement made herein. During the year the company's production sold for $802,304.51; its expenses for that time were $573,027.48, showing a profit for the year of $229,777.03—this on ore some of which went but $11\frac{66}{100}$ pounds of copper to the ton, or, at 16 cents per pound, $1.85 per ton.

THE strike of the machinists from Chicago eastward is not likely to affect in any material way trade or manufacturing conditions west of the Missouri. There are about 150,000 machinists; of these about 70% are members of the International Association of Machinists. Their present claims are for a nine-hour day, a minimum wage scale, and limited placing of orders in different shops. It is thought that geographical conditions alone will preclude probability of any movement other than sympathetic on the part of the machinists throughout the western half of the continent, as the grievances complained of have no local existence, there being general good feeling and harmonious understanding between employes and employers in this region. The matter is of importance in connection with the activity in the mining industry and the large number of orders for mining and structural machinery now on the books of every manufacturer all over the country, in Colorado and on the Pacific coast. Chicago is the present storm center of strife. The machinists' officers claim that if a general strike is ordered 90,000 men will go out. San Francisco has had salutary experience with this thing, and it is not at all likely that Pacific coast machinists will be active participants in the present differences.

Concentrates.

A PHOTOGRAPH can not be copyrighted.

NO PARALLEL SIDE LINES, no extralateral rights.

CORPORATION STOCK, in California, is not legally non-assessable.

IN California the election of a non-stockholder as director in or of a corporation is not legal.

ARIZONA'S mining law does not allow the relocating of claims to avoid assessment work—a salutary act.

SNOWSHOES on horses are not unknown in California, being occasionally used in Plumas and Sierra counties.

"ROCK IN PLACE" is any rock, mineralized or unmineralized, in the solid mass of the mountain, other than float.

CLEANLINESS, care and the use of zinc and common soda aid greatly in preventing pitting and corrosion of boilers.

THE August, '99, gold output of the Rand, South Africa, was 459,710 ounces The October output is stated to have been 63,000 ounces.

A CUBIC FOOT of quicksilver weighs 847.89 pounds. In a column of quicksilver every foot in height gives a pressure of 5888 pounds per square inch.

SINCE the admission of Utah as a State, the territorial law against foreign mining investments is abrogated, and aliens may secure mining property therein.

THE California State Mining Bureau at San Francisco will make a qualitative test of any new or peculiar mineral specimen forwarded to it, but does not make assays or quantitative tests.

MINE SHOES AND DIES wear at different ratios in different places. The cost of wear per ton of ore depends on price, from 2 cents at Homestake, S. D., to 13 cents at Mammoth, Arizona.

THE question as to alien ownership or occupation of mining ground in this country can only be raised by the federal government, and usually does not come up till application for a patent.

WHEN a mining location is made in the United States by a corporation, all the stockholders at the time of such location must be citizens of the United States. McKinley vs. Wheeler, 130 U. S. 630.

NO ADVICE can be herein given as to the purchase of any mining stock. "Buy when they are cheap and sell when they are dear" may, however, continue to be quoted, as it can not be improved.

A LODE includes everything between the hanging and foot walls, and, even if outside, there may be an impregnation of country rock of equal value to that in the fissure, that also is a part of the "lode."

A PROTEST against the issuance of patent to a claimant to a mining claim by any one not claiming any interest in the mining claim itself must be filed in the local land office at any time before the patent is issued.

A CANTILEVER, strictly speaking, denotes a girder fixed at one end and otherwise unsupported. The collective term "cantilever bridge" is usually applied to a bridge structure of which a cantilever forms a component part.

THE Woods dry placer miner, manufactured by Fraser & Chalmers, Chicago, might be a good machine of the kind asked about, as they claim that it will handle material not dry, if the moisture therein be not sufficient to cause it to clot.

FROM 2600 tons of California ore, assay value $13, it would be fair to assume a gross value of $10,000 caught on the plates, and about 300 tons worth, gross, $50 or $60 per ton. With ordinary milling, that amount of such ore should yield $25,000, gross.

WHAT is said to be a satisfactory solvent for gold and silver is afforded by heating a dry mixture of one part of potassium ferrocyanide with about two parts of common salt to incipient fusion, the product to be poured into molds, and, for use, to be dissolved in water.

THERE should be no prejudice among miners against a mining "expert," provided he is a real expert. He is a good friend to the miner, has killed many swindles and caused the opening of good mines and the investment of capital, and has encouraged the honest promoter.

IT is the as yet unrealized hope of scientists to generate electricity direct from coal. It is not to be considered impossible. It can not, however, be assumed that any method may be devised of consuming zinc to compete with coal in the indirect production of electrical energy.

LOCATIONS of minerals upon the public domain in this country are confined exclusively to citizens of the United States or to those who have declared their intention to become such; but in this regard a corporation is considered a citizen, and so are a woman and a minor, and they may each make valid mining locations.

GOLD AMALGAM may be liquid, pasty or solid, according to the proportions of the metals present, and the purity of the amalgam. When mercury is present to the extent of 90% the amalgam is liquid; when the percentage of mercury decreases to 87 the alloy becomes pasty, and when only 84% is present the amalgam crystallizes.

UNLESS in case of shutting down or complete cessation of work the destruction of plates for the sake of the absorbed amalgam is not considered good mill practise or effective economy. The greatest absorption of gold takes place in the first few days of the run, and thus the larger part of the value recovered by destruction of the plate is immediately taken up from the daily amalgam.

IN sampling ore the sample should show the average value of the ore as mined, including all that goes with it. The biggest item of expense in handling gold ore is in the mining, not the milling of it, so that a sample should represent what is to be mined. Whether it is all going to be put through the mill or not is another matter.

AN excessive use of quicksilver in a stamp battery will run the greater part of the amalgam into the sluices. Acids or cyanide of potassium are not recommended in cleaning the plates, there being a tendency to burn and harden the copper. The cost of mining and milling per ton is usually determined by dividing the total tonnage mined and milled into the total costs; the yield per ton is the tonnage milled divided into the gross bullion product.

IT is always business, and usually necessary, to secure a U. S. patent to a mining location. The possession of such a title argues powerfully for the owner's belief in the value of the property. It is, also, almost an axiom that few mines can lay claim to real greatness or value until or unless it has been held up in court by some pirate with a shadowy claim to an interest in the property, and in such likely case a U. S. patent provides "an ironclad potency" that is of most value when most needed. Then, too, it is a matter of profit to the publisher of the paper nearest the property and usually he has helped to make the property worth patenting by frequent and friendly allusion to it.

IN testing drinking water for purity, if lime is suspected, put two drops of oxalic acid into a glassful of the water and blow on it. If it turn milky, lime is present. For lead evaporate by gentle heat a little of the water nearly to dryness in a clean porcelain cup; moisten the residue with acetic acid and add to a portion of it a few drops of strong hydrosulphuric acid; a black precipitate indicates lead. A few drops of common syrup added to water will cause it to turn green if it contain earthy matter. If iron be present a little prussiate of potash will cause the water to turn blue. These are only simple tests. In a case of importance, analysis by a competent chemist is necessary.

IN electrical transmission it is best to follow success, to let others with capital experiment, and to employ proved methods. Line losses may be reduced by employing thicker conductors and higher voltages. Both involve increased outlay. In case of possibility of cheap production by water power the most economical way is to lay down the simplest and cheapest hydraulic plant, to generate a current at a low temperature, to spend as little as possible in copper by using the least metal section consistent with security from overheating and breakage, and to let the big concerns experiment with aluminum or anything in which the factors of success have not been fully determined.

FOR the measurement of the energy output from a monocyclic electric generator a single monocyclic primary meter may be used having potential connections to a primary meter transformer and series connections precisely similar to those of the monocyclic power meter. For the measurement of energy on monocyclic primary circuits carrying heavy motor loads, two meters are desirable to secure the most accurate results. Where two meters are used, the second instrument is connected in series with the teazer circuit, and its potential connection is brought out from the center of the primary winding of the primary meter transformer. The second meter is, therefore, wound for one-fourth the potential between primary mains.

THE size of a boiler has no relation to its pressure, which is always quoted as the pressure per square inch of surface of the containing shell or tubes. The gross strain on the metal is in proportion to the size. The thickness of the shell is increased in large boilers. The power of a boiler is not alone due to its pressure; the volume of steam that a boiler can furnish at a rapid pressure is the measure of its power. The heat of steam when confined is a measure of its pressure, and the reverse. Steam in the boiler at eighty pounds pressure is 37° Fahr. hotter than the steam at forty pounds pressure; as much heat may be obtained from the low-pressure boiler, for ordinary purposes, as from a high-pressure boiler, but a larger volume of steam must be used.

TO TEST potassium cyanide solution for small quantities of cyanic acid is a delicate chemical process that requires careful manipulation. The cyanide solution must be closely concentrated. Where potassium cyanide can be procured for the test in considerable quantity it should be dissolved in as little water as possible, most of the cyanide present dissolved out by absolute alcohol. Through the alcoholic solution filtered off from the potassium cyanide, carbonic acid is then passed to decompose the remaining cyanide. The potassium carbonate thus formed is filtered off and the filtrate tested with cobalt acetate. Gradual and gentle heating of the alcoholic solution while the carbonic acid is passing through aids the removal of hydrocyanic acid. If the operation is properly performed it is possible to detect from 1 to 0.33 parts of potassium cyanate in 100 parts of potassium cyanide.

A CUBIC INCH of water evaporated under atmospheric pressure is approximately converted into 1 cubic foot of steam. The horse power of boilers as per standard adopted by the Am. S. M. E. is thirty pounds water evaporated per hour at a pressure of seventy pounds per square inch and from a temperature of 100° Fahr. Well-designed boilers under successful operation will evaporate from seven to ten pounds of water per pound of first-class coal. Each square foot of heating surface is considered to evaporate two pounds of water. Therefore, for an engine using thirty pounds water per horse power per hour, each horse power of the engine requires 15 square feet heating surface in the boiler. On 1 square foot of fire grate can be burned on an average from ten to twelve pounds hard coal, or eighteen to twenty pounds soft coal per hour with natural draft. Two and one-quarter pounds of dry wood is equal to one pound of average quality soft coal.

FORMULÆ for making flashlight powder have been so often published herein that repetition should be unnecessary. The best way, the safest procedure, is to buy ready-made magnesium compounds. There is always danger to the inexperienced in making or using these powders. A simple and comparatively safe method is as follows: Get one ounce magnesium powder and one ounce negative gun cotton from some reliable dealer in photographic material. Put on a dust pan enough cotton when pulled out to measure about 3½ inches diameter; sprinkle this over with twenty grains of the magnesium powder—enough to form a thin, even film. Lay over the magnesium thus arranged a very thin layer of gun cotton. Connect to the bunch of cotton a small fuse of twisted cotton about 6 inches long, so that it will extend to the side of the dust pan. Then set the pan on a stepladder near whatever is to be photographed, and, when ready, light the gun cotton fuse with a match; a brilliant flash will instantly ensue.

AN "ore break" is a local Colorado term for a "fissure vein," or a "break" in the rock accompanied by ore. Sheeting or multiple fissuring is thought by some to be due to shrinkage accompanying the cooling of the volcanic rock. A line or region of weakness is considered likely to be a line of least resistance for future fracturing, and even though a quartz vein may form along a line of rupture, healing the rock and strengthening it with a substance harder than the wall rock itself, it is supposable that the next break will take place along the line of weakness presented by the imperfect cohesion existing along the plane of contact between the hard quartz and the less resisting rock. Such gradual penetration of mineral solutions into the immediately encasing country may finally obliterate divisions due to multiple fissuring. Sheets of rock separating one from the other would be replaced by ore, and thus nothing remain of the original structure except faint partings in the lode, such as are less evident to the eye than to the hand of the miner, who instinctively uses them to assist him in breaking ore.

THE rain falling on the rocks sinks into every crack and crevice, carrying with it into these fissures surface material which has been degraded by the weather, and thus affording a matrix sufficient to start the growth of vegetation, and afterward to maintain the plants. The fibers and roots of these plants, bushes, and trees thus brought into life, growing and expanding, act as wedges to split up the surface of the rock and to commence the process of wearing away. From this quality of destruction a large class of plants derive the name of Saxifrages, or rock breakers, from their roots penetrating into the minute fissures in search of water, and so assisting in the process of disintegration. In winter the water collected in the hollows and crevices becomes frozen, and expanding as it changes into ice, acts like a charge of blasting material in breaking up the rocks. The pieces thus detached become further disintegrated by frost and weather, and, being rolled over and over and rubbed against each other as they are carried away down the mountain currents, are ground gradually smaller and smaller, till from fragments of rocks they become boulders, then pebbles, and finally sand. As the mountain stream merges into the river the pebbles and coarse sand continue to be rolled along the bottom of the channel, while the argillaceous particles and salts become mingled with the water, and flow on with it either in suspension or solution.

IN assaying for metallic mercury or for cinnabar, reduce the ore to a fine powder, so that the sample to be assayed will all pass through a sieve of 2000 holes to the linear inch. Weigh out from ten to twenty grains of ore, according to its richness; intimately mix with five to ten times its weight of finely powdered litharge and distill in a small glass retort over a spirit lamp. The retort is to be heated very gradually at first over the spirit lamp, and, finally, the heat is raised until the assay is fused, and the glass softens and nearly melts. The greater portion of the mercury will be found in the receiving cup, but small particles will generally be found in the condensing tube. Heat the tube slightly, which will bring the minute globules of mercury together; remove them carefully with a feather and add them to the globules in the cup. The retort and its fused contents should now be broken up in a horn spoon or porcelain dish, in which a small quantity of water has been previously put, and, after vanning, examine carefully with a magnifying glass to see if any globules can be found. If they are, the assay should be repeated. Slightly heat the receiving cup over the lamp, taking care to have it half full of water. The fine globules of mercury will then unite in one globule. Pour off the water, and dry the mercury with blotting paper; remove to a small weighing cup and ascertain its weight on the balance. The mercury so obtained can be considered pure.

Successful Precipitation From Solutions Weak in Cyanide.

Written for the MINING AND SCIENTIFIC PRESS by MATT W. ALDERSON.

In a contribution to the MINING AND SCIENTIFIC PRESS last year ("Cyaniding Slimy Ores and Tailings," issues of June 2, 9, 16, 23 and 30, 1899), I dwelt at length on the most important phase of cyaniding—precipitation. In that article I detailed the system by which I had succeeded in precipitating from solutions containing as great a quantity of cyanide as half a pound to the ton, and gave the theory on which the result was apparently brought about, based on experiences in actual work. Further experiments have not only led to modifications of views then entertained, but to successful precipitation from solutions containing hardly more than a trace of cyanide.

Based on the fact that I had removed heavy incrustation from zinc with strong cyanide solution, and that with this incrustation removed perfect precipitation had followed from solutions weak in cyanide, I conceived the idea of placing a small quantity of cyanide in the entrance to the extractor as frequently as once in every six hours. I supposed by so doing I would cause the zinc to stand for a short while in very strong solution and that in this way any incrustation on the zinc shavings would be removed. The incrustation which prevented or retarded precipitation was kept from forming, and the theory was supposed to be sound. Curiosity, however, prompted a test to see how strong in cyanide the solution became after the cyanide salt was added to the head of the extractor, with the following result:

The solution entering the extractor carried seven-tenths of a pound of cyanide to the ton. One and a half pounds of cyanide were then placed in the entrance of the extractor and the solution was allowed to run through slowly, the effluent being carefully tested.

Strength in cyanide in eight minutes, 1.5 pounds; strength in cyanide in twenty-three minutes, 2.2 pounds; strength in cyanide in thirty-five minutes, 2.1 pounds.

The speed of the fluid was then increased to the rate of over one ton an hour and samples tested gave results as follows:

Strength in cyanide in	45	minutes	.....1.7	pounds
"	" 60	"	.....1.1	"
"	" 75	"	.....1.1	"
"	" 90	"	.....1.0	pound
"	" 120	"	.....1 0	"

Here was an apparent upsetting of the theory which had led to the adoption of the system, and extra care was taken to see if there was any change in results; but precipitation was always perfect, contrary to the experiences of all who say that it is necessary for the fluid entering the extractor to carry from $\frac{1}{10}$ to $\frac{2}{10}$ of 1% of free cyanide (two to four pounds per ton) to secure perfect precipitation.

The curious fact was developed that the cyanide salt placed in the head of the extractor did not disseminate itself speedily throughout the solution, but even, though dissolved, seemed to be taken up gradually. A further test as a check, covering longer time, gave results as follows;

The solution entering the extractor registered six-tenths of a pound to the ton. One and a half pounds of undissolved cyanide of potassium were placed in the head of the extractor and the outgoing solution was then tested:

Strength in cyanide in	1	minute	.9	pound
"	" 8	minutes	.9	"
"	" 18	"	.9	"
"	" 28	"	.9	"
"	" 38	"	.9	"
"	" 48	"	.9	"
"	" 1 hour and 42	"	1.5	pounds
"	" 4 hours " 20	"	.9	pound
"	" 7 " " 15	"	.8	"

The condition of the zinc shavings at this time was always perfect, and the indicators showed no evidence of incrustation. On the contrary, the precipitation was such that the zinc discs, used as indicators, as I have heretofore described, were rapidly disintegrated.

In the comprehensive article by Prof. S. B. Christy on "The Solution and Precipitation of the Cyanide of Gold," (see MINING AND SCIENTIFIC PRESS, Jan. 23, 1897), that gentleman says:

"I had prepared a solution of potassium auro-cyanide with about 1.3% metallic gold and no free cyanide. A solution made from this by dilution, so as to contain 0.1%, or $603 per ton, gold, was then treated with strips of sheet zinc for twenty-four hours. The strips were carefully burnished with emery paper, or with a sharp knife, to avoid any film being left on the surface of the zinc. Commercial sheet zinc was used, as is done in practise. The solution was contained in glass tubes, sometimes at rest, sometimes rotated mechanically for the whole period of twenty-four hours.

"In no case was more than a trace of gold precipitated. In many cases, where the zinc was brightly burnished, not a trace of gold came down, and the strips weighed exactly the same to a hundredth of a milligramme before and after the test, and when dissolved in sulphuric acid left no trace of gold."

Prof. Christy precipitated this gold without difficulty on zinc shavings, and, continuing, says:

"These differing results are very difficult to explain on the simple substitution reaction usually accepted. If the gold precipitates on the shavings, why should it not do so on the same sheet of burnished zinc from which the shavings were made? There is a larger surface of contact, it may be suggested. But even the smallest fragment of a zinc shaving will precipitate gold on itself, while in the same solution the freshly scraped surface of sheet zinc, many times its area, is entirely or practically without action. It may be thought that the turnings had a cleaner surface than the scraped zinc, but this cause was carefully eliminated.

"All the indications point to the phenomena of 'polarization,' so well known in electrolytic work, where the formation of invisible traces of films on the surface puts a stop to further action, either by preventing contact or by setting up an opposite electromotive force."

The accompanying illustrations tell their own story. Fig. 1 is of an ordinary zinc disc (after the major portion has been removed on the turning lathe). This disc was purposely left a little larger than usual. It has an inch hole in the center and measures 3¼ inches across. Fig. 2 shows a similar disc after remaining for some time subject to the precipitating action of potassium auro-cyanide solution. Fig. 3 shows the remains of a disc left for still longer time in the extractor. The originals of these interesting specimens can be seen at the office of the MINING AND SCIENTIFIC PRESS. They are proof that gold can be successfully precipitated on sheet zinc under ordinary conditions, and would seem to controvert the experience of Prof. Christy. But let us examine further. Continuing his investigations, Prof. Christy says:

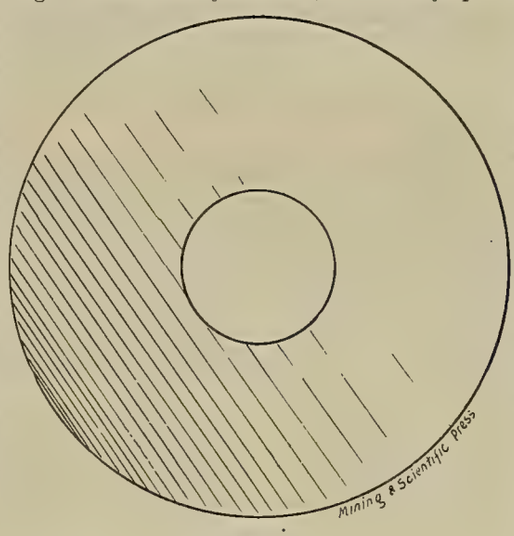


Fig. 1.



Fig. 2.

"When to a solution of potassium auro-cyanide which has been left for twenty-four hours in contact with zinc strips, without action, a little free cyanide of potassium is added, the gold comes down at once and the precipitation is soon complete. This fact seems an additional confirmation of the reaction that I have suggested. It will be remembered that the formation of the insoluble cyanide of zinc is a feature of this reaction. If this occurs, it is certain that a film of this substance, perhaps infinitely thin, must cover the surface of the zinc, and, in addition to the film of hydrogen, prevent the contact necessary to continue the reaction. The presence of free cyanide of potassium, of course, readily dissolves this film and the reaction is free to continue."

I have quoted at length from Prof. Christy's article because of the importance of his investigations and the fact that his results and conclusions offer the most lucid explanation of the reactions which take place in the extractor, confirmed as they are by results in actual practise.

The conclusion of the whole matter is that imperfect precipitation comes from films of one kind or another on the surface of the zinc, kept from forming in most cyanide plants by the use of very strong solution—two to four or more pounds of cyanide to the ton. With the addition of a little free cyanide to the head of the extractor, these films are removed, and for a reasonable time as perfect a precipitation can be effected with a weak solution as with a strong one. The past summer, when treating some tailings at the Schmidt & Johns mill, at Silver Star, Mont., the consumption of cyanide was greater than usual, and some of the strong solution entered the gold vat and extractor, carrying but two-tenths of a pound of cyanide to the ton. The precipitation in this instance was in every way as perfect as if the solution had carried ten pounds of cyanide to the ton. It is not only possible, theoretically, and on a small scale, to precipitate on zinc shavings from solutions weak in cyanide, but it is done every day in Montana on large-scale work, where thirty or more tons a day pass through an extractor.

I am aware that several criticisms of positions taken by Prof. Christy have been published, and Alfred James, to whom cyaniders are certainly indebted for many helpful suggestions as aids to precipitating from auropotassic solutions low in cyanide, in a friendly criticism of the article by Prof. Christy from which I have quoted, says: "Prof. Christy goes out of his way to assume the necessity of the presence of free cyanide of potassium." In the next paragraph, it seems to me, Mr. James confirms the stand taken by Prof. Christy, for, after explaining his idea of the difficulty of starting the precipitation when using very dilute or KCy free solutions, he says: "In practise this difficulty is seldom encountered except when starting a new plant, and may be easily overcome by adding a little free KCy to the boxes at the outset." (See Transactions of the American Institute of Mining Engineers, Vol. XXVII, page 835).

With deference to the opinions of so distinguished an authority as Mr. James, and his idea that the secret of successful precipitation from solutions low in cyanide is in giving long contact with the zinc, I must say my experience is quite to the contrary. With the zinc in perfect condition, large quantities of zinc and long contact therewith are unnecessary. Where Mr. James would use 1 cubic foot of zinc shavings to the ton of solution passing through the extractor each twenty-four hours, less than half this amount has been in use with us in Montana the past summer. I quote in this connection a letter recently received from one of my pupils, who installed a plant in an adjoining State the past summer. He says: "My precipitation has been most excellent the greater part of the time. I make my evaporations in tin pans and use ten assay-ton charges. The greater part of the time these ten assay-ton charges do not give a weighable button of gold from the zinc-box outflow. I am using but four compartments of my zinc box; it has nine, but, as the four give almost perfect precipitation, it is useless work to take care of more. The size of the zinc space is, in each compartment, 18 inches in depth, 15 inches in width and 30 inches in length."



Fig. 3.

The preference of most cyaniders seems to be for

zinc boxes with small compartments. Mine is decidedly in favor of such a one as is above described. (See illustrations in MINING AND SCIENTIFIC PRESS, June 23, 1899). With an extractor of such proportions, the gold solution is brought in intimate and immediate contact with a large surface of zinc, and oftentimes 90% of the gold contents of the solution will be precipitated on the first 2 or 3 inches of the zinc in the bottom of the first compartment. At other times, and with some ores, the precipitation will be more diffused; but it is very seldom that the precipitates in the second compartment are of value. My experience is that if you do not get your gold in the head compartment of the extractor, and it drags its way down through the compartments of a zinc box 20 feet or more in length, as I have seen in days gone by, the gold will still pass out at the outflow, in spite of all efforts to secure it. There are not many compartments in my zinc boxes to-day, and no apprehensions are felt if four of these are well filled with zinc shavings. With other conditions right, such an extractor will do perfect work.

In concluding, I think it well to express a few words of caution to the inexperienced. In starting precipitation in a new plant, or until, on pushing down the zinc shavings in the extractor, there is a good effervescence of hydrogen, the strength of the gold solution passed through the extractor would better be at least one pound of cyanide per ton. When the zinc is active, the solutions may safely be brought down to half a pound to the ton and occasionally to even less. The addition of the undissolved potassium cyanide to the head of the extractor should be made once every six hours. If left for periods as long as nine hours, especially with very slimy ores or those which produce more than the usual amount of silt, there is danger that films will form to such an extent as to interfere with and retard the precipitation. The system is valueless in the hands of careless persons or those who do not appreciate the value of method in their work.

Long Distance Electrical Transmission.

Most notable in science is the advance in electrical transmission of power, both in distance and voltage. In California has been obtained the highest measure of practical development, where an extraordinarily high voltage is successfully transmitted eighty miles.

In the New York Electrical Review appears an article on this subject from Louis Bell, which takes up the matter of even longer distance electrical transmission in a practical way. He premises that the limit of power transmission in distance and voltage is necessarily indeterminate, for the distance practicable is a function of the price of fuel and the voltage is in the main a function of the climate, and goes on: "To make a trial at very long range and extreme voltage feasible, the necessary combination of circumstances consists of a good market, a very high price of coal and a climate dry enough to make insulation easy. Given these conditions and we may reasonably expect something of a revelation in the way of power transmission. To the best of the writer's knowledge, the one region to which one may reasonably look for the next great step is the neighboring republic of Mexico. A few years since there came to the writer a most intelligent Mexican gentleman with a proposition for power transmission on a scale that was fairly startling. It involved sending 1000 H. P. over a line 200 miles long to a group of silver mines in the mountains.

"At first it looked rather desperate commercially, but on careful investigation it showed every indication of being a paying proposition. At the mines in question coal cost $40 per ton in gold, for every ounce of it had to be carried eighty miles in bags on the backs of burros. The water power was one of the magnificent high heads common along the backbone of the continent and was not itself inaccessible, while over most of the route rain was a sort of septennial institution not to be seriously considered. All this was seven years ago and the slump in the price of silver put the proposition to sleep shortly afterward, but it will be instructive in the light of our present experience to compute the proposition anew and to see the possibilities it opens to both commercial and electrical enterprise.

"To begin with, we must realize that the present upper limit of high voltage seems to be set by the tendency of the air to fail as a dielectric. So far as the transformers are concerned the splendid insulating properties of oil have not been put seriously to the test by even the highest experimental voltages. Given the necessity and there would be no serious difficulty in the way of building large transformers to deliver to the line pressures of 100,000 volts or more. Glass and porcelain and oil will stand the strain. But the air begins to play one false long before this. With ordinary commercial machines at ordinary frequencies the losses by leakage through the air between line and line are sufficiently formidable at 50,000 volts to call a halt in further progress and even with wires 4 or 5 feet apart. Ten or fifteen thousand volts more may be gained by using generators giving a close sinusoidal wave and spacing the wires still wider.

"For a working voltage one might safely go under existing conditions in a very dry climate to 60,000 volts. Let us see what sort of a line this will give. Take the energy generated at 1000 kilowatts and assume the distance as 200 miles and the loss at 10%.

"Using the stock formula for three-phase lines

$$\text{c. m.} = \frac{D + 11 + \frac{W}{V}}{V_1}$$

$$\text{one has } D = 1060,\ \frac{W}{V_1} = 20,\ V_1 = 5000,$$

and the case calls for 46,640 circular mils. This is not far from No. 3, which would probably be chosen for the purpose. As to the matter of inductance with wires about 6 feet apart and at a frequency of 40—, the impedance factor of the line is so near unity as to be amply compensated by the extra cross-section of the conductor, leaving the drop at just about the assumed figure. As to resonance the constants of the line do not give a period anywhere near the frequency, so that no trouble need be borrowed on that score.

"Now for the copper: About 3,200,000 feet of No. 3 would be required, weighing about 160 pounds per 1000 feet, in all about 512,000 pounds, worth, delivered, about $100,000.

"For the line one would need about 8000 poles, and for a rough estimate of the cost, set with wire in place, allow another $100,000. Hydraulic costs are very variable, but taking our data from a typical high head plant of this capacity will give a useful approximation. Fifty thousand dollars is not wide of the mark for this item, and allowing a proper amount for dynamos, transformers and general equipment, including the very necessary telephone line, it is quite safe to say that the total cost of the plant, including a moderate amount of distributing circuit, would fall within $350,000.

"On this amount 20% should easily pay all fixed charges and operating expenses, so that a sale of 1000 H. P. at $100 per H. P. year, would not only care for all the fixed expenses but pay interest on the stock of the concern and provide a liberal sinking fund. Now, in point of fact, the price noted is less than the cost of producing power in units of moderate capacity, even in localities where coal is no more than $5 or $6 per ton. If coal rises from transportation charges to the neighborhood of $10 per ton, electrical power, transmitted even so great a distance, could cut under the cost of steam power very materially and secure a paying market. On a larger scale, the cost of transmitted power would, of course, fall below the estimate given, and by so much the more give it the advantage. There is every reason to expect, then, that a 200-mile transmission from water power would pay in a good many instances, given only a reasonably good market. Obviously it would pay handsomely under conditions anything like those noted in beginning this article. There is little doubt that it would have been a good investment seven years ago in spite of the falling silver market, for it would have greatly reduced the cost of production at the mines concerned. Although it is not difficult to figure out a profit in even longer transmissions on a large scale, we are not likely to get capital interested in such enterprises until some case has been worked through to commercial success under conditions so favorable as to leave no doubt of the result. It is doubtful whether such conditions exist within the limits of our own country, although ultimately we may expect long distance work on a colossal scale.

"In Mexico and portions of South America, however, one may reasonably expect to find such cases as have been instanced, and it is to this quarter that we must look for the pioneering work that has to precede anything like settled practise. Possibly in a favorable climate it would be worth the while to experiment with voltage even above 50,000, with the help of very widely spaced wires and extraordinary precautions in insulation. Such a procedure of course increases the cost of the pole line, while decreasing the cost of copper alone, and at a certain point further increase would cease to pay. It is doubtful, for instance, whether it would pay to increase the distance between wires to the extent of using separate pole lines for each leg of the circuit, but there is still great room for improvement in line insulation in general. The engineering value of a very long transmission at extreme voltage would be very great, and the present note is intended to call attention to the fact that under circumstances which actually exist such an enterprise can have a commercial value fully commensurate with its scientific importance."

IN a recently published memoir by M. Biedermann on the production and relative value of gold and silver, he shows that in the year 1500 the world's production was 5.8 tons gold and 4.7 tons of silver, the relative value of the two metals being in the ratio of 10 to 1. From 1700 to 1870 the ratio varied from 15.20 to 15.51; since then it has doubled. The following institutes a comparison between 1872 and 1898:

	1872.	1898.
Gold production (tons)	173.9	435.1
Value (millions of dollars)	121.3	303.7
Silver production (tons)	196.9	593.0
Value (millions of dollars)	88.9	93.7
Relative value of gold and silver	15.9	35.2

A Modern Dredger Mining Plant.*

Written for the MINING AND SCIENTIFIC PRESS.

Recent accounts have appeared of gold dredging machines in successful operation in California, Idaho, Colorado, Montana and Oregon. The dredging system for recovering gold originated in New Zealand, but during the last few years has been successfully applied in the United States.

The Bed Rock Dredging Company, Philadelphia, Pa., and their associated companies have for two seasons carried on successful operations in placer mining at a point about thirty miles distant from Boise City, Idaho. Previously, direct current apparatus has been exclusively employed to operate motors upon dredgers, the current being generated either upon the dredger, or in close proximity thereto. The Bed Rock Dredging Company was the first to employ alternating current and polyphase motors for all their operations, the electrical equipments being supplied by the Westinghouse Electric & Manufacturing Company.

A district of about 200 acres of gold-bearing land was acquired by this company. Fifteen miles from the scene of the dredging a power house was constructed of substantial corrugated iron, measuring 20x30 feet. Current is generated by a 500-volt Westinghouse two-phase alternating current generator, direct connected to a Pelton water wheel. Water is conveyed to the wheel by a ditch eight miles long, having a capacity of 1000 miners' inches, i. e., 20 cubic feet per second. In many places the ditch has been blasted out of solid rock. From the terminus of this aqueduct a sheet iron pipe descends to the power house, and supplies the Pelton water wheel under a head of 350 feet. Fig. 1 gives a view of the pipe line. Figs. 2 and 3 show the water wheel connected by a flange coupling to the 400 kw. Westinghouse generator, running at 360 revolutions per minute, with a frequency of thirty gallons per second. The exciter, of the standard Westinghouse type of 125 volts, is belted to the water wheel, as shown in the illustration. In Fig. 4 are shown two 200 kw. Westinghouse transformers of the self-cooling, oil-insulated type, which raise the voltage from 500 volts two-phase to 10,000 volts three-phase for the transmission circuit. From the power house a three-wire three-phase circuit of No. 4 B. & S. gauge bare copper wire carries the current. The wires are supported on wooden poles and Locke high-tension porcelain insulators, with porcelain pin protectors to prevent leakage to pin.

About 600 feet distant from each of the three dredgers now in operation a small building has been erected, in which are placed the lowering Westinghouse transformers, reducing the pressure to 400 volts two-phase. A full equipment of Wurts non-arcing lightning arresters and choke coils is provided for the 10,000-volt circuits, to protect the generator and transformer stations.

The dredgers are known as the "ladder" or "elevator bucket" type, with a capacity of 3000 cubic yards a day, each of them having the following electrical equipment of 400-volt two-phase Westinghouse type "C" motors: One 75 H. P. motor operates a string of heavy buckets upon the ladder of the dredger, each having a capacity of 3¼ cubic feet, which discharge upon the delivery plate at the rate of thirteen buckets per minute. The working of this motor is controlled by a reversing switch and auto-starter. Two other 75 H. P. motors are direct-connected to centrifugal pumps for furnishing water to hold the screened dirt in solution and to force it along the sluice box for the washing process. The material dredged consists of boulders, cobbles, sand and gold, and is passed by gravity from the delivery plate into a perforated revolving screen set on a slight incline. The water thoroughly disintegrates and washes the material as it slowly passes down the screen. The water, fine gravel, sand and gold drop through the perforations in the screen into a distributing box, from which they pass on to the different sections of gold-saving tables by means of doors in the distributing box. The gold-saving tables are made of cast iron to avoid warping and leaking.

A 20 H. P. variable speed motor swings the dredger into necessary positions, and another 20 H. P. motor operates the grizzly and screen; both are controlled by reversing switches and auto-starters.

The controlling and starting apparatus for all the motors is placed in the cabin of the dredger, which also contains a complete outfit of indicating instruments, automatic circuit breakers and switches, conveniently arranged on marble panels, for observing and properly controlling the operations of the dredger. This arrangement permits one operator to supervise and regulate every movement.

The grounds surrounding the dredger are lighted by incandescent lamps from the 400-volt alternating current, through suitable transformers. The general scheme and details of the dredging operations were worked out by S. S. Harper, general manager of the several companies, and the successful results that have been attained are greatly due to his experience and judgment.

*For illustrations referred to see front page.

Cheap Mining and Milling at the Spanish Mine.

Written for the MINING AND SCIENTIFIC PRESS by HORACE F. BROWN, M. E.

About four miles northerly from Washington, in Nevada county, Cal., the now deserted Spanish mine stands as a monument to the energy and daring of man. Probably the record of this mine has never been equaled, and certainly never broken, for cost of operation and tonnage worked, in proportion to the labor employed. It is credited with paying a profit from ores carrying but 65 cents per ton, and has a special record for work still more phenomenal.

For years I have heard of mines that were considered valuable, the owners proudly claiming an average of $1 per ton, 35 cents more than the Spanish, and consequently far more desirable. It is very alluring to hear of mines where there is a vast amount of ore so much better than the Spanish, and a great temptation to the unwary investor, and I know of several parties who are contemplating the erection of a small plant on properties of their own, fondly thinking that they can repeat the success of that remarkable mine.

Such statements as are being made have their influence, and often to the sorrow of the victim, and it seems pertinent to give some of the conditions surrounding the work at the Spanish, and which must prevail to insure success in kindred enterprises.

The Spanish mine outcrops near the summit of a high, mountainous ridge that forms the north bank of Poor Man creek.

The vein partakes of the character of a massive blowout, being composed of numerous seams of quartz, porphyry, clay seams and broken masses of slate, etc., so broken and jumbled up at the surface as to appear very unlike a vein.

The foot wall stands nearly vertical and shows massive columns and abrupt faces several hundred feet above the bottom of the cut that has been quarried out. The hanging wall is composed of tilted masses of rock that stand at an angle that brings the seams flatwise to the pressure of the superincumbent earth, making an ideal wall for holding the top soil and loose rock back as the cut was quarried to depth.

The mass of ore was very wide at the surface, and in mining the hanging wall has been cut back so it becomes still more self-supporting.

Its stability, however, has been tested to the limit and the whole face is gradually creeping and crumbling so that further work is impossible.

Without noting the various tunnels that were driven in on the various seams and clay veins, reference will be made to the principal means of carrying on the work.

The principal tunnel is carried back under the mountain for about 750 feet, is well timbered and provided with several chutes for loading.

The method of carrying on the work of mining will be understood by referring to sketches Nos. 1 and 2.

From the various chutes upraises were made to the surface centrally between the walls of the vein or blowout.

Beginning at the surface, the vein was quarried off and dropped down to the chutes below. The work was carried on so as to at all times keep about an angle of 45° in every direction from the upraises. A vast amount of waste went down with the ore, and, it being impossible to sort or discriminate, waste and all went to the mill. With the most favorable conditions of walls, the work could not be carried on during the winter and early spring.

The rains and snows saturated the somewhat soft vein matter, and the action of frosts completed the disintegration of a very large portion, so that a few holes churned in were sufficient for blasting down almost a season's supply of ore for the mill. Owing to the slacking of the walls, due to exposure, the dangers and difficulties increased as depth was gained, until even Chinamen were loth to take the risk, and the work was abandoned.

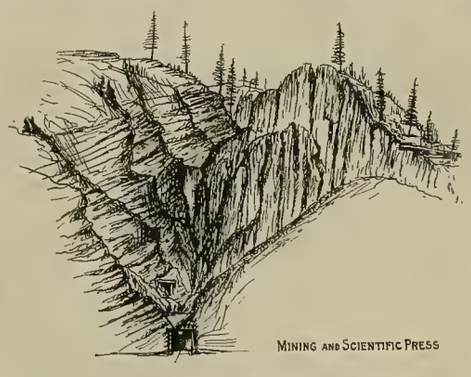
The milling plant consisted of ten stamps and four Huntington mills. This plant was capable of crushing between 8000 and 9000 tons per month. The mill was fully equipped with automatic feeders and labor-saving devices, so that but a minimum amount of labor was required, and everything that experience could suggest to cheapen the cost was provided.

To facilitate the handling of the ore a most excellent side-dumping tipple was invented and perfected by the millwright, William Hogan, who afterwards patented the same.

The device consists of a short framework upon which a section of track is formed, and segments of a circle secured at each end hold the frame in position. These segments rest upon four wheels, placed in relation to the load so as to bring the tipple out of balance when loaded and the reverse when the car is empty. The cars used hold about one ton and are fitted with side doors and automatic coupling devices.

A train consisted of ten cars, drawn by a mule. This train was passed over the tipple, one at a time, and it required but one and one-half minutes to dump and couple the ten cars. The tipple is controlled by a projecting lever and held in position by a latch. The door fastenings project at each end and are automatically opened by means of fixed stops which engage with the latches as the car begins to dump.

When the car is on the tipple the wheels opposite the door are under a suitable guard, which suffices to hold the car firmly on the track. A slight depression in the track rail acts as a stop for the car, and by means of the lever the rapidity of the dumping can be regulated and the car held in position until all fine or wet material is discharged. The cars couple automatically and are ready for the return trip within two minutes from the time the first car is uncoupled, and often within one and a half minutes.



The Spanish Mine — Cross-Section.

This is given as an example of the devices and brain work that contributed so much to the success of the Spanish mine.

About 1000 feet from the mill there occurs a belt of gold-bearing rock similar to the softer portions of the Spanish mine.

A test run of thirty days was made on this material, the amount crushed being about 9000 tons. This was quarried in the same manner as in the main mine, and trammed 1000 feet, the cost of mining and milling, with all expenses connected therewith, amounting to exactly 25 cents per ton. The saving in the mill just equaled the expense, and it was decided that 25-cent ore was rather too low grade for profitable working. This is probably the best record ever made for mining and milling.

I append a sketch to show a plan for semi-quarrying of ores where conditions are not favorable for full open-cut work, as explained to me by James White, who was for several years connected with the management of the Spanish mine.

The vein is first opened by a tunnel A and chutes. From the chutes upraises are made each way, as shown at B, and from the apex of the angling upraises a vertical upraise is put to surface C. The raises B from the chutes are filled with surface waste, quite full, a bulkhead at the bottom preventing the waste from entering the chute.

Stopes are then run in the roof of each angling upraise, using the waste as a floor to carry the ore to the chute. This gives a loose end for blasting and forms a chute that carries away all the ore without shoveling or other handling.

Sufficient space will be left along the roof after each filling to admit of ventilation, and using the top debris for filling the stopes not only relieves the mill of crushing an enormous amount of waste but supports the walls and makes timbering unnecessary. In this manner mines can be worked to any required depth with safety, while with open quarry work the depth is limited owing to the danger of falling walls, etc.

It also makes it possible to confine the work to any strata of the vein, instead of taking everything between country rock, as in open quarry work.

As each successive stope is taken out the space is filled, the bulkhead at the chute serving to continue the chute upward, making increased storage for ore until the surface is reached.

The chute should be carried up as a double-compartment shaft, the smaller compartment serving as a manway.

The apexed pillars of ore that are left in the bottom serve as a protection to the tunnel, and after the mine is exhausted can be mined out, to a large extent, with safety.

The practicability of this scheme of mining would depend on local conditions, of which each one must be his own judge, but, having been developed from years of experience at the Spanish mine, is worthy of consideration.

[The following is a record of one month's run of the mine, prepared from the superintendent's report:

MINE—COST OF PRODUCTION.

RUN—TWENTY-EIGHT DAYS' WORK PRODUCED 3443 TONS OF ORE.

	Labor.	Supplies.	Total.
Extracting ore	$ 703 50	$113 41	$ 816 91
Delivering ore to mill	160 20	17 95	178 15
Dead work	105 20	10 93	116 13
General expense	78 35	1 95	80 30
Total	$1,047 25	$144 24	$1,191 49
Cost per ton	.304c	.042c	.346c

MILL—COST OF REDUCTION.

RUN—TWENTY-FOUR AND ONE-HALF DAYS REDUCED 3443 TONS OF ORE.

	Labor.	Supplies.	Total.
Mill expenses	$227 32	$194 33	$421 65
Water for power	.....	161 70	161 70
Handling ore	154 50	5 35	159 85
General expense	78 40	1 95	80 35
Total	$460 22	$363 33	$823 55
Cost per ton	.133c	.106c	.239c
Bullion produced			$3,138 55
Total expenses			2,015 04
Profit			$1,123 51

This run of ore yielded a trifle over 91 cents per ton; a profit of 32.6 cents per ton resulted. The percentage of profit was 35.8 of the total.—ED.]

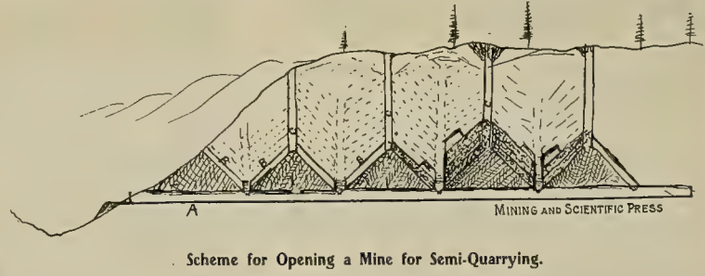
Apparent Requirements in the Case.

TO THE EDITOR:—Please answer through your "Concentrates" or otherwise, if a 2-inch pipe could be run from a 4 H. P. gasoline engine 500 feet underground to the outside through a tunnel where it would take two elbows? Would it take any of the power off of the engine, and could it be done successfully? I have one like that and the smoke bothers us so much we can not stand it and do not know what can be done with it. Would the size of the pipe make any difference?

There are two or three possible things which may cause the smoke of which our inquirer speaks. Possibly the piston in his engine has become worn and permits a considerable proportion of the burnt gases to escape by the piston instead of through the exhaust port. If such is the case, the cylinder should be rebored and a new piston made that will fit, though possibly new piston rings would prevent the escape of this gas. Two-inch pipe is not large enough to carry off the exhaust of a 4 H. P. engine, where 500 feet is required; more or less back pressure is created, which will interfere with the exhaust valve and reduce the power that he can obtain from his engine. It is suggested that he use say two lenghths of standard wrought pipe, 3 inches in diameter at the engine, and from the end of the standard pipe to the surface we would recommend 3-inch or preferably 4-inch riveted slip joint pipe. This is not expensive and will easily carry off all the exhaust gases without creating any back pressure. From reading the inquiry one might come to the conclusion that he has no exhaust pipe at present and is exhausting in the tunnel; if so, it is a wonder he or his men have not been suffocated.



Spanish Mine — Section Along the Vein.



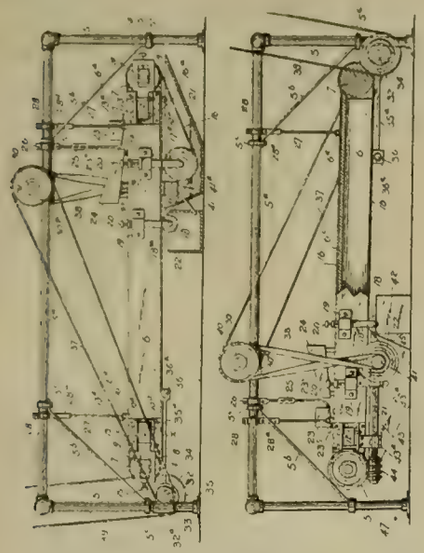
Scheme for Opening a Mine for Semi-Quarrying.

Latest Mining and Metallurgical Patents.

Patents Issued March 13, 1900.

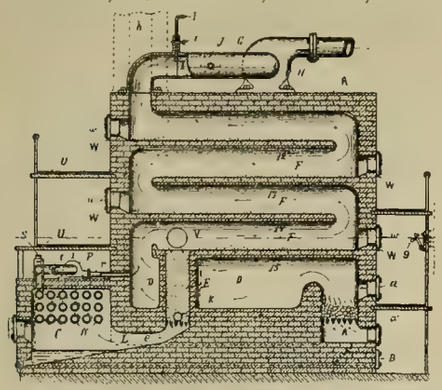
Spec'ally Reported for the MINING AND SCIENTIFIC PRESS.

VANNER.—No. 645,061; H. T. Benson, Denver, Colo.



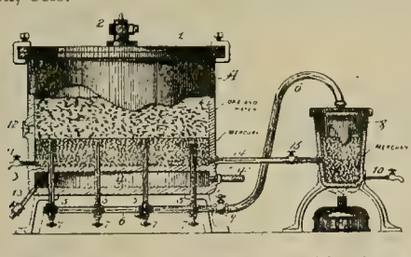
An ore-concentrator combination with frame of an oscillatory vanner box suspended therefrom, rolls located at ends of vanner box, shafts of rolls passing through bearing blocks 14 which are adjustable back and forth in recesses in the supports 12 by set screws 15; plates 10 provided with flanges 10^a to which rear ends of support 12 are hinged by hinge bolts 13^a passing through eyes in flanges 10^a and eyes in rear ends of supports; bolts 13 extending through eyes in flanges 10^a adapted to hold supports 12 against side rails 6; strips 10^c adapted to lie between flanges 10^a and top and bottom edges of supports 12 to a adjust height of supports, a tank 21, a roll 17 therein, and a traveling apron surrounding vanner box and its end rolls and passing under roll 17.

PROCESS OF REDUCING EASILY OXIDIZABLE METALS.—No. 645,178; C. W. Miles, Cincinnati, Ohio.



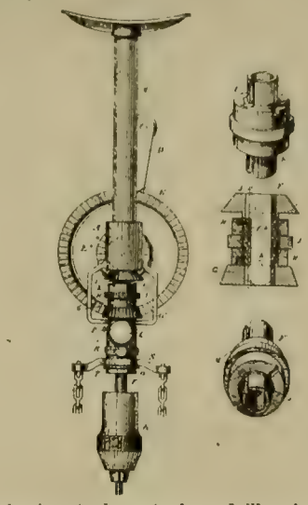
A process of reducing zinc ore consisting in supplying air to a body of fuel, passing the products of combustion around a mass of the ore and carbon, subdividing current of products of combustion, passing portion thereof though mass of ore and carbon, cooling vapor so produced and thereby condensing the metallic fumes, mixing the uncondensed residual gas with remaining portion of the current of products of combustion, and conveying them in contact with the raw ore.

SEPARATOR FOR GOLD AND SILVER BY AMALGAMATION.—No. 645,188; F. A. Rider, Vekol, Ariz., assignor to the Detroit Reduction Company, Cripple Creek, Colo.



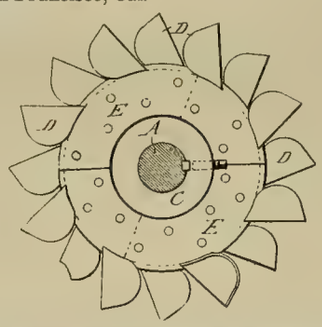
An amalgamating apparatus, combination with tight vessel having steam chamber in its bottom adapted to contain a body of mercury immediately above steam chamber and mixed water and ore above the mercury, of a series of jet pipes projecting up through bottom of vessel and adapted to terminate at or near surface of body of mercury, a separate mercurial vapor generator, and a pipe communicating with separate generator and with the jet pipes.

BORING DRILL.—No. 645,219; C. S. Stafford, San Francisco, Cal.



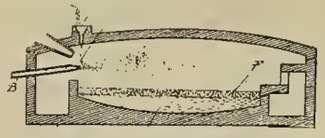
In a boring tool, a stock, a drill spindle turnable therein, a sleeve mounted on spindle, a driving gear journaled and turnable upon stock, and having outer and inner rows of teeth, pinions turnable upon sleeve, the teeth of one engaging the outer and the other the inner teeth of gear, a two-part collar loosely fitting sleeve between pinions having slots in ends adapted to engage corresponding lugs upon inner faces of pinions, a key or feather slidable in keyway in spindle having ends upturned to engage the two parts of collar and unite them so that they become one and move in unison, a disk turnable upon sleeve between inner ends of two-part collar having screw threads fitting corresponding threads on sleeve whereby collar may be advanced to engage either pinion and be disengaged from the other.

WATER WHEEL.—No. 645,221; S. T. Tutthill, Oakland, Cal., assignor to Tutthill Water Wheel Company, San Francisco, Cal.



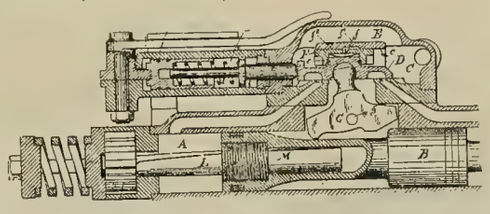
A water wheel consisting of disk hub and shaft to which they are secured, vertically disposed segments bolted flatwise against vertical sides of disk having radially disposed ends abutting directly against each other to form substantially a continuous plate on each side of disk whereby the strain upon bolts is equally distributed, segments each formed integral with a plurality of buckets with buckets on one side of disk occupying spaces between those on other side.

PROCESS OF REFINING IRON.—No. 645,205; F. W. Hawkins, Detroit, Mich.



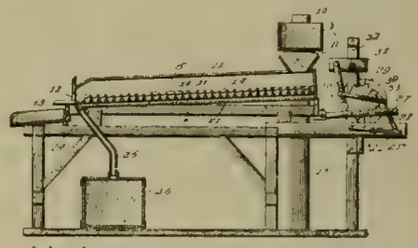
A method of refining iron consisting in first atomizing or breaking up and scattering the molten metal into minute particles by a blast and in then filtering the separate particles through a heated bed of comminuted basic material.

ENGINE FOR ROCK DRILLS.—No. 645,536; P. H. Reardon, San Francisco, Cal.

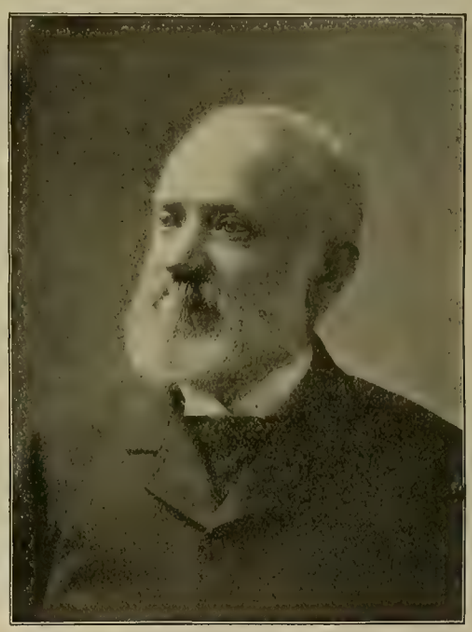


A rock drill comprising a cylinder, a fluid-actuated piston therein, a slide valve in suitable valve chamber adapted to control the fluid, a tappet interposed between piston and slide valve to operate latter by motion of former whereby piston is reciprocated, a pressure-relieving device on slide valve consisting of a stationary surface between which and the valve seat the valve is located, and a loose plate socketed on back of valve bearing against surface and means for varying stroke of piston; a rock arm interposed between valve and piston whereby valve is moved by motion of piston in one direction directly and a spring adapted to move valve in opposite direction.

CONCENTRATOR.—No. 645,533; J. Mauldin, Sacramento, Cal.



A sluice box, a combination of longitudinal ribs 19, transverse bars 20, riffle plates 16 formed with riffles 17 presented with their vertical faces against the flow of water, overlapped with spaces 18 between them and secured upon the crossbars 20 the ribs 19, wedges 22 inserted between the overlapped portion of said plates, above crossbars, screws 23 passing through overlapped ends of riffle plates impinging wedges, and plates to crossbars.



Addison C. Rand.

Mr. A. C. Rand, President of the Rand Drill Co., New York City, died on the 9th inst., after a brief illness, aged fifty-nine years. He was born in Westfield, Mass., in September, 1841, and was a member of an old New England family, prominent since the settling of the colonies. He was one of the pioneers in rock drilling and air compressing machinery, and was identified with many of the mechanical and engineering societies. He had filled the office of treasurer of the Engineers' Club of New York City from its beginning, and, among other societies, was a member of the American Institute of Mining Engineers, the American Society of Mechanical Engineers and the Chamber of Commerce. He was a director of the New England Society, of the Ninth National Bank and of the Lafin & Rand Powder Co.

Mr. Rand's name will always be linked with the development of rock drilling and air compressing machinery. He was one of the first in this field of work, and while much work with drills had been done at the Hoosac Tunnel before his connection with the industry, their use was only possible because that enterprise had the State of Massachusetts behind it. The use of rock drills in civil engineering work on an economic basis began at the West Point Tunnel of the West Shore R. R., though the Haverstraw and Weehawken Tunnels soon followed. Following this came the tunnels of the abandoned South Pennsylvania R. R., and, soon after, the Washington and New York aqueducts. It seems almost incredible that an appliance, without which no large work of this character would now be attempted, could have been of so recent origin. Machine drills became an accepted fact in mining before they did in civil engineering work—the place of their birth, in an economic sense, being the iron mines which center about Port Henry, N. Y., though the iron and copper regions of Lake Superior district soon followed.

The Assay of Copper Materials for Gold and Silver.*

By L. D. GODSHALL, Spokane, Washington.

The extreme difficulty of obtaining a short and, at the same time, exact method for the determination of gold and silver in copper materials has been well illustrated in "Assays of Copper and Copper Matte," and its discussion by Dr. A. R. Ledoux and other leading authorities on this subject.

Two general methods were used by the numerous assayers who took part in the symposium initiated by Dr. Ledoux, and whose results are given in the paper and discussion. One of these is the dry, or fire method, consisting of scorification and cupellation, the former being repeated if the percentage of copper is very high, all slags and cupels being assayed, and the results so obtained added to the ordinary assay; and the copper retained by the silver buttons being determined and deducted from the combined weight of the buttons obtained from the assay of the original material, the scorification slag and the cupel.

The other is the wet, or combination method, which, while not involving so much work, requires a longer time. Briefly, it is as follows: The material to be assayed is dissolved in nitric acid, the solution is diluted, and the fine undissolved gold is collected by means of sulphate of lead, formed by the addition of lead acetate and sulphuric acid to the solution. After standing from twelve to twenty-four hours, the precipitate is filtered off, and the silver in the filtrate is precipitated as a chloride or bromide and collected by means of sulphate or bromide of lead. The solution containing this precipitate in suspension is again allowed to stand until the precipitate has settled. It is then filtered; both precipitates, containing the gold and silver, are dried, ignited and scorified, either separately or together, and the result is cupelled in the usual way.

The above methods are open to several objections, the most important of which is the amount of work required for the one, and of time for the other. Moreover, the undissolved gold is naturally in an exceedingly fine state of division; the sulphate of lead, though heavy, is a fine precipitate, slow to filter, and, unless care is taken, liable to go through the filter paper. Again, in case any gold is dissolved, through impurities in the reagents, or from other causes, there are no means of detecting or saving it. In order to overcome these objections, the writer proposes to make use of two reactions, namely, the fractional precipitation by means of H_2S and the reaction between precipitated copper sulphide and a soluble salt of silver.

The method as proposed is, in brief, as follows: Take 0.5 to 4 A. T. of the material to be assayed (the quantity depending on the contents in gold and silver). Dissolve in dilute nitric acid, adding a small quantity of sulphuric acid at the same time. The latter is not absolutely necessary, but facilitates the subsequent removal of the excess of nitric acid. The nitric acid should be added in small quantities at a time, as required, to avoid too violent action and the use of a large excess. When the solution of the copper is complete, the excess of nitric acid is evaporated, and the remaining solution is allowed to cool, and is then diluted, first with a little cold, then with hot water, and H_2S is passed into the hot solution for a few moments. The exact time has not been determined, but will depend on the contents of silver and the flow of the gas. The idea is to precipitate just enough sulphide of copper to insure the complete precipitation of the silver, and at the same time to collect the very fine undissolved gold. If any of the latter is in solution, the precipitated sulphide of copper will react upon it and render it insoluble. The precipitated sulphides of silver and copper are coarse and flocculent, and settle almost immediately. The fine gold is readily collected by these sulphides, and the solution can be filtered in a very short time. The precipitate is dried on the filter paper, which is then ignited very gently in a scorifier in front of the muffle and scorified in the usual way.

The filtrate obtained from the above precipitation can be tested for silver with a pinch of salt or a drop of Hcl, or this may be added at the time H_2S is passed into the solution.

The object of all partially wet methods for the assay of gold and silver in the presence of copper is to remove the latter, to avoid the otherwise heavy losses in cupellation. It may be objected to the method here proposed that, after attempting to remove the copper, it again mixes a certain quantity of that metal with the gold and silver. It is evident, however, that the quantity of copper thus added to the gold and silver can be so regulated as to be insignificant in amount, and in no wise to affect the accuracy of the assay.

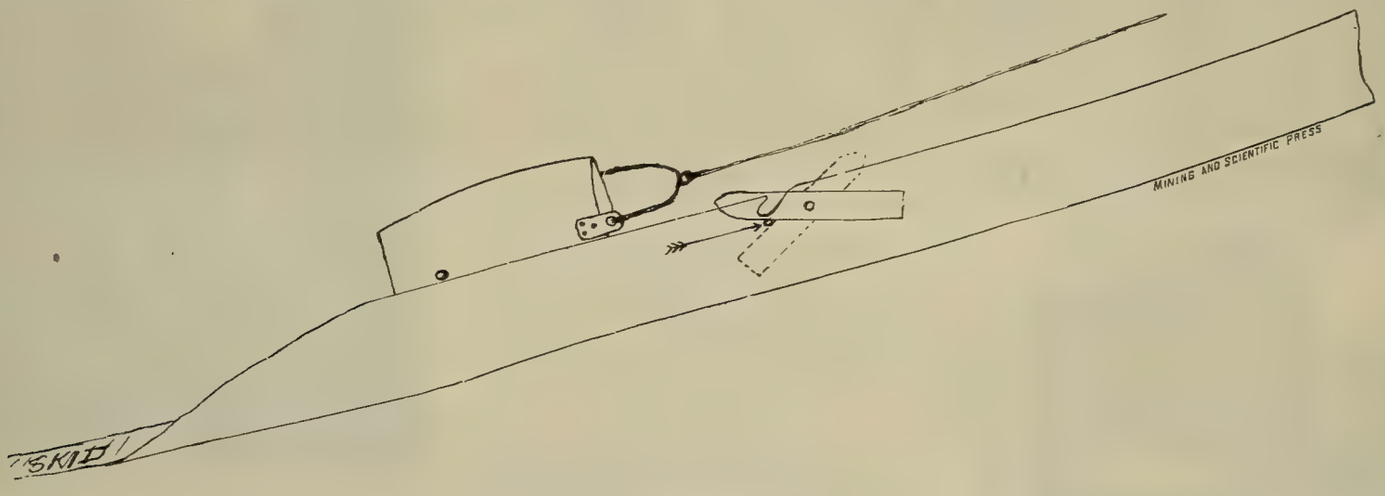
The advantages of this method seem to the writer to be of considerable importance. The reagents used need not be chemically pure; the time required is but little more than that needed for an ordinary assay; and less care and skill are necessary for the determination than other methods demand.

* Transactions of the American Institute of Mining Engineers, Washington Meeting, February, 1900.

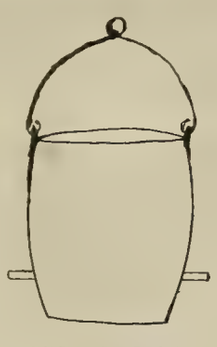
Self-Dumping Bucket for Incline Shaft.

TO THE EDITOR:—I enclose a sketch of a trip and self-dumping bucket I use on incline shafts. There is nothing new about it except the arrangement or placing of the small bolt at point of arrow, by placing it as shown in sketch and using 3 or 3½-inch strap iron, pointing one end as shown. You will not be bothered by trips sticking, as they usually do in cold weather, by freezing.

The square end of trip is always left a little longer than the pointed end to bring it back to a vertical position after letting bucket down, but by placing bolts as shown in sketch the lugs on bucket will force them to do their work under any reasonable circumstances.



Trip and Self-Dumping Bucket for Incline Shafts.



Self-Dumping Bucket.

I also show a rough sketch of the pattern of bucket used. I used one as described all last summer and it gave perfect satisfaction.

I would like to say also that in the ventilation of mines by a fan I have never found conditions such that would justify using a fan as a blower: by that I mean that the fan should be placed so that it sucks the air out of the mine instead of blowing it into it. If you suck the air out the fan has only to work against the size of pipe used; if you blow air in, the fan practically has to work against the size of shaft, or tunnel, as the occasion may be. These are conclusions I have come to by actual experience.

Spokane, Wash., March 15. MINER.

Two Curious Lakes of Nevada.

Written for the MINING AND SCIENTIFIC PRESS by H. W. FAIRBANKS.

In the heart of the Carson desert, about two miles east of Ragtown, there are two strange lakes whose waters are rich in soda.

The lakes occupy what are without doubt the shallow craters of extinct volcanoes. The gently undulating desert extends for miles in every direction and the presence of either craters or water would not be suspected if one were no more than a mile or two distant.

Driving through the soft, volcanic ashes which here cover the ground we ascend a gentle slope for a little distance and suddenly find ourselves on the brink of a shallow depression, perhaps 75 feet deep. In the center is a pond of yellowish water and around the margin are sheds containing piles of white, crystallized soda. This depression is not more than one-fourth of a mile across. (See engraving of Little Soda lake, first page.)

Continuing a little distance in a northeasterly direction the larger crater is soon seen. (See engraving of Soda lake, first page.) It is fully one mile across and more than 100 feet deep. It is occupied by a beautiful sheet of water, set in a rim as perfect and symmetrical as though it had been shaped by hand.

The water is shallow and intensely alkaline, although around the margin there are springs which are fit to drink. On the south side are the buildings of the company which is engaged in extracting soda from the waters. The usual method of separating the soda is employed. Ponds are made by raising embankments to separate portions of the water from the main body, and the water in them allowed to evaporate until the soda separates out as a thin layer over the bottom. At the time of my visit a new mill had just been put up for the purpose of refining the product before shipping it.

The great interest attaching to these lakes is their peculiar formation. Although the rims about the lakes are but slightly raised above the surrounding desert, the shape of the depressions is such as to make it clear that they were once the seat of explosive volcanic agency. No lava ever flowed from them, but over the surface of the region around there is a thick layer of fine ashes or pumice, while about the immediate rim there are most perfect specimens of volcanic bombs. Masses of liquid lava were hurled in the air and in many cases they were yet viscid when striking the ground, for grains of sand are imbedded in them.

Many craters of this kind occur to the westward about Mono lake, but nowhere, except in Oregon, do I know of any as large or as perfectly formed.

THE London Daily Mail says that since Johannesburg became the premier gold-producing field in the world the Americanization of the town and its surroundings is noticeable. Our veracious English contemporary declares that the Kaffirs talk with a strong New York intonation and "the casual talk of the mines is redolent of California rather than of Cornwall. The shops are full of the latest and best American machinery, run by American experts and erected by some of the cleverest mechanicians in the world. The assayer hails from Grass Valley, the cyanide man has put in his time at the Alaska–Treadwell, the chlorination superintendent used to be a cow puncher, and the battery man is more at home in San Francisco than in Johannesburg. Owing to the tact and ready resources of the Californians, everything worked with the utmost smoothness."

MINING SUMMARY.

ALASKA

At Cape Nome all lines of supplies, except dogs, are reported plentiful. Lumber is $75 per M feet, 100 pounds, a single sack, of coal, costs $50. A letter from Cape Nome says: "Bonanza district has been left on as by grasshoppers, and now there is a grand rush for Kodsedagera. The big excitement is at Mill Creek, fifteen miles above Prince of Wales. York is attracting a big lot of attention, and good results are shown. Above Cape Rodney is the latest, called New El Dorado district. The trail is hot with people for this district. There will no doubt be a big stampede for Norton Creek, as $11 a pan is reported. Other creeks yield 10 and 15 cents at the surface. The beach is being worked with good results, and coarse gold at times shows up."

ARIZONA

GILA COUNTY.

At Globe the Old Dominion mine and mill have been closed down and 250 men discharged. Only twenty men have been retained to work on the Continental property, which was recently purchased by the Old Dominion for $70,000. Difficulty in getting coke is the reported cause of the temporary cessation of work.

A later report says: "Old Dominion ore is abundant and plant is in good shape. 125 men have been laid off. 125 men are now working. The smelter has no coke, but will resume when supply arrives."

The Kassor is now the only producing gold mine in Globe district. The Supt. is J. E. Davies.

GRAHAM COUNTY.

Mgr. Colquhoun reports that in the years from 1893 to 1899, inclusive, the production of the Arizona Copper Co. has risen from 1078 tons to 9081 tons. Taken in percentage, the production of 1899 represented 746.46 as compared with 100. Taking the profit of 1891 as 100, that of 1899 was 1551.8. Taking 1895, when things had begun to improve, the profit was 240. Taking the cost per ton of 1893 as 100, the cost of 1899 was 96.5. Taking the price per ton in 1891 as 100, the price in 1899 was 144.4, but taking the profit of 1893 as 100, the profit per ton in 1899 was 618.95. The pressure put on the works has had the effect of wearing them out more rapidly than they were prepared for, and the company is receiving $225,000 out of the revenue of 1900 and will retain $200,000 out of the revenue of the current year. A dividend for the year of $1.87 per share has been declared.

The Detroit Copper M. Co. at Morenci now employs nearly 500 men. The completed concentrating plant has a capacity of 500 tons daily. There are in place six 125 H. P. gasoline engines, which furnish the power to run the concentrators, crushers and furnaces. The matte is converted by a pneumatic process. The daily output is from twenty-eight to thirty-five tons of bar copper, 98 fine. The company proposes to build a railroad to Guthrie, on the Gila river, connecting with the Arizona & New Mexico Railway, nineteen miles in length.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence.)—The Shenandoah M. Co., of San Francisco, T. J. Parsons, Pres., has an encouraging strike in the Easton mine, the south extension of the old Red Cloud, two miles north of Plymouth.

On the 200-foot station of the new incline, the south level, 100 feet in length, exposed a 16-foot vein. Of this, the hanging and foot-wall portions assayed from $6 per ton upwards. The incline was deepened to 375 feet, the vein leaving the incline below the 200-foot station. A 34-foot crosscut to the west (foot wall side) failed to show the vein, excepting a seam. Crosscutting from the incline, 8 feet east, 5 feet of good ore was discovered. Of this, the assay certificate of an averaged sample gives $57.88 per ton in free gold and 2% of sulphides assaying $218.30 per ton—$4.36 per ton of ore.

Plymouth, March 20.

At the Royal Consolidated mines, at Hobson, the shaft is down 940 feet, working on a large vein. Forty stamps are dropping and a site is being graded for eighty more.

CALAVERAS COUNTY.

Near Angels, the Big Bonanza mine, under the ownership of the Oriole M. & M. Co., has resumed operations. F. E. Dunlap is Mgr.

At Camp Seco, W. W. Cook is about to put a 10-stamp mill on his mine.

EL DORADO COUNTY.

(Special Correspondence.)—At the German mine mill and hoist are run by water, there being 320 feet fall at the former and 280 feet at the hoist. The mill has ten stamps, a vibratory amalgamator, and shaking table. Ten additional stamps will be put in this year. Forty tons are daily crushed. The ore comes from the 400 and 600 feet levels. A station is being cut at the 800 level. The ore runs from 2% to 6% sulphurets, and these are sent to Selby's. The ledge is from 1 to 15 feet in width. At the hoist the engineer's levers are at the collar of the shaft, instead of being near the engine, as in most cases. Ingeniously contrived speed indicators of "home manufacture" are attached to the mill water wheel and to the vibratory amalgamator. C. O. Richard is superintendent and president of the company, G. M. Thomas foreman, Jas. Liddicoat foreman of mill. About twenty-five men are employed.

The Union or old Springfield mine, three miles south of El Dorado, was formerly owned by Alvinza Hayward. Upon a diminution in its output he ordered the mine closed down, pumps to be pulled out and work to cease. It remained idle until three years ago, when Harpending, Williams and associates bought it. It has to pay the purchase price for itself and other claims, paid for all improvements and left a surplus for its owners. There are six rich shoots of ore already exposed in the company's property, and three of these as yet have hardly been touched. Besides the 10-stamp mill at first erected, a second 10-stamp mill is nearly completed in another location. The property is about to be surveyed and mapped, after which a general plan will be decided upon for an extensive development of the widely separated ore shoots and the intervening ground. It promises to be a large proposition. A. F. Harpending is superintendent, C. C. Cantrell mine foreman, W. Taylor foreman of the mill. About fifty men are employed.

The Larkin gold mine, Diamond Springs, has been worked about four years by the present company. The vein is 4 feet wide quartz, ribbon rock and slate intermingled. The entire ledge is run through the mill. There are ten stamps in the mill and two concentrators. The ore runs 1½% to concentrates, which are sent to Selby's. A cyanide plant is projected. From working tests already made Supt. Jacobs is satisfied the sulphurets can be treated successfully. Three tons of ore to the stamp are crushed each twenty four hours. At the hoisting works a single reel hoist is used, which will do the work to 1000 feet depth. The vertical shaft is 900 feet deep. A double set of boilers of 150 H. P. capacity furnish steam for all purposes. The engine for the stamps is 25 H. P. A small hoisting engine is rigged to run the Cornish pump, which raises water from the 200 foot level, it being forced to that level from below by jack head pump. C. H. Jacobs is superintendent, W. E. Jones mine foreman, F. Walker surface foreman. On the average thirty-five men are employed.

The Griffith Consolidated gold mine, one half mile from the Larkin, is idle since Jan. 1st. This property is equipped with the best of modern machinery and at one time gave promise of developing into a dividend payer, but the owners were disappointed in the returns and ceased work, with the shaft but 750 feet deep. There is here as complete an electric plant as can be found in the State, the company having its own electric power house on the Cosumnes river, five miles distant. Eight claims are consolidated in this property. The ledge is 10 feet wide, low grade. Only two of the claims, the Griffith and Royal, have been developed, or even prospected. The property is owned by a Scotch syndicate, who also own the Jumper mine in Tuolumne county. About seventy-five men were employed when the mine was running, with Jas. Richards superintendent.

The Ribbon Rock and Tin Cup mining claims are near the Larkin at Diamond Springs. They are being prospected by E. A. Davis, who represents Alvinza Hayward. The latter has a bond on the claims. They are old locations, both on the same ledge, but little work has ever been done on either. Fifteen men are employed, J. H. Kelly foreman.

In the Big Canyon mine, five miles from Shingle Springs, the underground workings go down 745 feet, 200 feet vertical shaft, at the bottom of which a crosscut runs 70 feet to the ledge, where the second shaft is 545 feet deep. The hoist at the surface is run by water power and the air compressor is also direct connected to water wheels. The 30 stamp mill is run by water under 345 feet pressure, at the hoist the pressure is 305 feet. The ore runs 3% sulphurets, which are treated at the company's own chlorination works. Ninety tons of ore per day are put through the mill. Work was suspended last summer on account of scarcity of water, but operations were resumed Nov. 18th, '99. From forty to fifty men are employed, E. T. Kane superintendent, J. J. Kane foreman, Jesse Sell millman, Chas. Bowerman assayer.

At the Vandalia mines, one half mile from Big Canyon, the ore is worked dry in a 4 to 6 ton gravity jig, being too gummy to be run through a rotten mill; the ore is cyanided. It is so strongly acid that a percentage of lime (twenty lbs. to thirty pounds to the ton) is mixed with it before treatment. About thirty tons per day are now worked, but arrangements are completed to increase this to 100 tons. With a ledge 8 to 15 feet wide, prospected by three or four tunnels, there is a large reserve of ore blocked out. It can be stoped out from the tunnel levels to the surface. The motive power for the plant is supplied by two gasoline engines. C. E. Seymour and C. T. Shaver, the owners, have been operating the property two and one half years. They employ fifteen to twenty men.

The Crystal mine, near the Vandalia and Big Canyon, is handled by E. L. Simpson and Bowerman Bros. of Canyon. W. E. and Henry Klebsattel of Sacramento. This is an old mine, somewhat prospected. A tunnel 150 feet long runs into the side hill, tapping the ledge 100 feet below the surface. A shaft 170 feet deep on the ledge extends from this point. A new shoot has been struck from which ore will be taken for the mill. A 15 H. P. steam threshing engine furnishes motive power. The ore lately uncovered is expected to yield $15 per ton.

The Fisk is an old location near Placerville. Considerable has been taken out where the ore outcrops, and at other places the decomposed ore was sluiced off the sidehill with good results. A 5 stamp mill, run by water, has been started, and will work first the broken ore strewn along the hillside, later the levels will be developed by tunnels.

The Gentle Annie group of mines, one and one half miles north of Placerville, consists of five parallel gold bearing ledges, of which only the Gentle Annie ledge has been developed to any extent. Here there is a working shaft 400 feet deep, with 3000 to 4000 feet in drifts, and with upraises connecting different levels. But a small amount of stoping has been done, so that there are large reserves of rich ore. Proceeds from the same have largely paid for the development and plant. The latter consists in part of a hoist, run either by steam or compressed air ordinarily the latter, the air compressor located at a favorable point 3700 feet from the hoist, where there is a vertical fall of 442 feet. The water first does service at the mill, under 160 feet fall, before being used at the compressor. There is a cyanide plant for the sulphurets, of which the ore produces from 1% to 5%. On account of the death of one of the owners of the property work is temporarily suspended. H. J. Parlow, one of the partners, has charge of the property, A. L. McAfee engineer and machinist.

The Melton mine is on the south fork of the American river, two and one half miles from Placerville. The owner is dead. The property is in charge of an administrator. A company of miners has leased and is operating the mine and mill on a co-operative plan. The work proceeds with harmony and good effect. The ore, however, is low grade. The ledge is 30 feet wide, mineralized slate. A tunnel 700 feet long has been run into the side hill, whence the ore has been taken. Little stoping has been done. The 15 stamp mill and the air compressor are run by water power. The sidehill is so steep that the sulphurets are taken to a wagon by pack mules. J. H. Fuller is foreman, Al Philbrook and C. O. Forbes millmen.

Considerable is being done in the gravel deposits near Placerville. One extensive enterprise is that conducted by a company of which ex-State Senator Chapman of Placer county is the manager. This is a drift mine, two miles from Placerville. A tunnel 400 feet long runs into the gravel channel. The material is closely cemented and is fed from the dump into a Dodge crusher. The gold is caught in an amalgamator, on the aprons, and in the sluices below the mill. There is an ingenious arrangement for utilizing the waste water which splashes from the wheel. It accumulates in a tank and periodically sluices the boulders from the trough into which they are thrown by the crusher. About 100 tons of gravel are daily worked. Another tunnel will increase the output. Forty men are employed. Parker Bros. and Jos. Swansborough have charge.

The Stone gravel claim, adjoining, is leased to four miners, working on the co-operative plan. They take the gravel from a tunnel and put it through a regular 5 stamp mill.

At Kimble & Pike's gravel claim, adjacent, forty men are employed. There are two tunnels tapping the channel at points 500 feet apart. The cemented gravel is run through a 10 stamp mill, after which the pulp runs over silvered plates, then over 60 feet of riffles, and then into sluices. This is a profitable proposition, and at present rate of operations will last at least five years, as the company own seven eighths of a mile along an ancient river channel. The mill is run by water power. This claim is owned by Geo. W. Kimble of Placerville, who acts as superintendent, and D. H. Pike of San Francisco.

The Mountain Con. G. M. Co. is giving employment to nearly 100 men at its property in the northern part of El Dorado, near the North Fork of the American river, the boundary line between this and Placer county. Newcastle, Placer county, is the nearest railroad town, and the business of the mining company is largely done at that station. The mine was formerly known as the Zantgraff, an old location, and the only one of several owned by the company in its tract of 160 acres which has been developed. The ledge on the Zantgraff dips to the west at an angle of 16%. The walls are 4 feet apart, with 24 feet of solid quartz. The ore contains an unusual percentage of silver and last year the weight of silver recovered greatly exceeded that of the gold. Less than 1% of the ore in weight is contained in sulphurets, and these are shipped to Selby. The ore averages in value about $8 per ton. There are three other well defined ledges on the property, which have never been developed. The shaft is 1400 feet deep, the skips in which are run by electric hoist, with a steam hoist in reserve. The 25 stamp mill is also run by electric power, the company having its own power plant on the opposite side of the river, half a mile distant. The North Fork Ditch Co. supplies the water for this plant. With stamps weighing 1000 pounds each, 7 inch drop, 104 times per minute, and using 20 mesh screen, the mill reduces four tons of ore to the stamp, or 100 tons per day. Hand drilling is the practise in the mine, the company having no air compressor and no fans. It is, however, a well-ventilated mine, this result being largely accomplished through a drain tunnel which taps the ledge at the 300 level. E. Goodwin is superintendent, A. J. Blackburn foreman, Walter Humphreys shift boss, J. Walston millman, W. H. Hoag assayer.

Placerville, March 20.

FRESNO COUNTY.

The County Board of Supervisors will build a road to the copper mines of the Wabash and Copper King Companies.

NEVADA COUNTY.

(Special Correspondence.) Work conducted by the North Star Mines Co., Grass Valley, is on an extensive scale, and this continues to be one of the most interesting properties in the State. The work consists in the reopening of old and abandoned mines, and to the present point has demonstrated the correct judgment of the projectors now in charge. At the Blackbridge shaft, where the work of reopening began in 1896, and where much valuable ore has since been extracted, the shaft is now down to a depth of 1400 feet. Here sinking and drifting are constantly going on. At the North Star, where a depth of 2900 feet on the incline attained in former years has not been increased, a new shoot of ore has been uncovered by recent drifting, and this old property has taken on a new lease of life. At the Central North Star, where a vertical shaft was started in 1896 with the expectation of striking the New York Hill ledge at 650 feet, and the North Star ledge at 2000 feet or more, a depth of 1200 feet has been attained. At 645 feet the New York Hill ledge was cut, but drifting thereon has not been pushed to any great extent. Another ledge not the North Star has been cut recently, and this is reported to be quite rich. Sinking is going on as rapidly as possible. Within the past week a new pump with 30x18 inch cylinders has been installed, capable of throwing 600 gallons to the surface from a depth of 650 feet vertical. Smaller pumps do the work below that level. Power for the three shafts above named is generated at the compressor air plant on Wolf creek, distant from the Blackbridge 800 feet, from the Central shaft 1½ miles and from the North Star shaft about one mile. The air is reheated by use of petroleum as fuel, both at the Blackbridge and at the Central. At each of these shafts the compressed air is used for the hoists, pumps and power drills in the mines; at the North Star it is used only for power drills, the hoists, pumps and mills being run by water. There are two large compressors at the Wolf creek power house. One of these, the first put in, is run by a Pelton water wheel, 18 feet 6 inches in diameter, and requires 301 H. P. from the wheel, which is direct connected. The other compressor is of peculiar design and was originally run by water, but now by electricity. Water for the power house is brought 7070 feet in riveted steel pipe and delivered at the wheel under a head of 775 feet, or a static pressure of 335 pounds per square inch. As development progresses in the mines, constant additions are made to the already extensive plant of this company. It also adds frequently to its mining possessions

The Assay of Copper Materials for Gold and Silver.*

By L. D. GODSHALL, Spokane, Washington.

The extreme difficulty of obtaining a short and, at the same time, exact method for the determination of gold and silver in copper materials has been well illustrated in "Assays of Copper and Copper Matte," and its discussion by Dr. A. R. Ledoux and other leading authorities on this subject.

Two general methods were used by the numerous assayers who took part in the symposium initiated by Dr. Ledoux, and whose results are given in the paper and discussion. One of these is the dry, or fire method, consisting of scorification and cupellation, the former being repeated if the percentage of copper is very high, all slags and cupels being assayed, and the results so obtained added to the ordinary assay; and the copper retained by the silver buttons being determined and deducted from the combined weight of the buttons obtained from the assay of the original material, the scorification slag and the cupel.

The other is the wet, or combination method, which, while not involving so much work, requires a longer time. Briefly, it is as follows: The material to be assayed is dissolved in nitric acid, the solution is diluted, and the fine undissolved gold is collected by means of sulphate of lead, formed by the addition of lead acetate and sulphuric acid to the solution. After standing from twelve to twenty-four hours, the precipitate is filtered off, and the silver in the filtrate is precipitated as a chloride or bromide and collected by means of sulphate or bromide of lead. The solution containing this precipitate in suspension is again allowed to stand until the precipitate has settled. It is then filtered; both precipitates, containing the gold and silver, are dried, ignited and scorified, either separately or together, and the result is cupelled in the usual way.

The above methods are open to several objections, the most important of which is the amount of work required for the one, and of time for the other. Moreover, the undissolved gold is naturally in an exceedingly fine state of division; the sulphate of lead, though heavy, is a fine precipitate, slow to filter, and, unless care is taken, liable to go through the filter paper. Again, in case any gold is dissolved, through impurities in the reagents, or from other causes, there are no means of detecting or saving it. In order to overcome these objections, the writer proposes to make use of two reactions, namely, the fractional precipitation by means of H_2S and the reaction between precipitated copper sulphide and a soluble salt of silver.

The method as proposed is, in brief, as follows: Take 0.5 to 4 A. T. of the material to be assayed (the quantity depending on the contents in gold and silver). Dissolve in dilute nitric acid, adding a small quantity of sulphuric acid at the same time. The latter is not absolutely necessary, but facilitates the subsequent removal of the excess of nitric acid. The nitric acid should be added in small quantities at a time, as required, to avoid too violent action and the use of a large excess. When the solution of the copper is complete, the excess of nitric acid is evaporated, and the remaining solution is allowed to cool, and is then diluted, first with a little cold, then with hot water, and H_2S is passed into the hot solution for a few moments. The exact time has not been determined, but will depend on the contents of silver and the flow of the gas. The idea is to precipitate just enough sulphide of copper to insure the complete precipitation of the silver, and at the same time to collect the very fine undissolved gold. If any of the latter is in solution, the precipitated sulphide of copper will react upon it and render it insoluble. The precipitated sulphides of silver and copper are coarse and flocculent, and settle almost immediately. The fine gold is readily collected by these sulphides, and the solution can be filtered in a very short time. The precipitate is dried on the filter paper, which is then ignited very gently in a scorifier in front of the muffle and scorified in the usual way.

The filtrate obtained from the above precipitation can be tested for silver with a pinch of salt or a drop of Hcl, or this may be added at the time H_2S is passed into the solution.

The object of all partially wet methods for the assay of gold and silver in the presence of copper is to remove the latter, to avoid the otherwise heavy losses in cupellation. It may be objected to the method here proposed that, after attempting to remove the copper, it again mixes a certain quantity of that metal with the gold and silver. It is evident, however, that the quantity of copper thus added to the gold and silver can be so regulated as to be insignificant in amount, and in no wise to affect the accuracy of the assay.

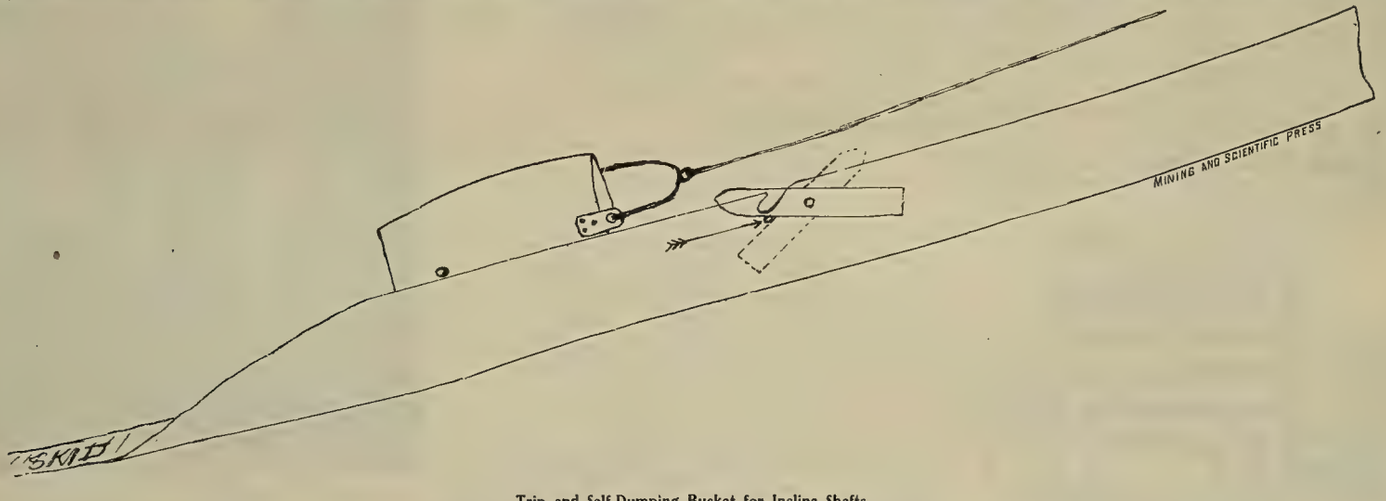
The advantages of this method seem to the writer to be of considerable importance. The reagents used need not be chemically pure; the time required is but little more than that needed for an ordinary assay; and less care and skill are necessary for the determination than other methods demand.

* Transactions of the American Institute of Mining Engineers, Washington Meeting, February, 1900.

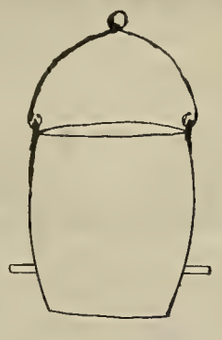
Self-Dumping Bucket for Incline Shaft.

TO THE EDITOR:—I enclose a sketch of a trip and self-dumping bucket I use on incline shafts. There is nothing new about it except the arrangement or placing of the small bolt at point of arrow, by placing it as shown in sketch and using 3 or 3½-inch strap iron, pointing one end as shown. You will not be bothered by trips sticking, as they usually do in cold weather, by freezing.

The square end of trip is always left a little longer than the pointed end to bring it back to a vertical position after letting bucket down, but by placing bolts as shown in sketch the lugs on bucket will force them to do their work under any reasonable circumstances.



Trip and Self-Dumping Bucket for Incline Shafts.



Self-Dumping Bucket.

I also show a rough sketch of the pattern of bucket used. I used one as described all last summer and it gave perfect satisfaction.

I would like to say also that in the ventilation of mines by a fan I have never found conditions such that would justify using a fan as a blower: by that I mean that the fan should be placed so that it sucks the air out of the mine instead of blowing it into it. If you suck the air out the fan has only to work against the size of pipe used; if you blow air in, the fan practically has to work against the size of shaft, or tunnel, as the occasion may be. These are conclusions I have come to by actual experience.

Spokane, Wash., March 15. MINER.

Two Curious Lakes of Nevada.

Written for the MINING AND SCIENTIFIC PRESS by H. W. FAIRBANKS.

In the heart of the Carson desert, about two miles east of Ragtown, there are two strange lakes whose waters are rich in soda.

The lakes occupy what are without doubt the shallow craters of extinct volcanoes. The gently undulating desert extends for miles in every direction and the presence of either craters or water would not be suspected if one were no more than a mile or two distant.

Driving through the soft, volcanic ashes which here cover the ground we ascend a gentle slope for a little distance and suddenly find ourselves on the brink of a shallow depression, perhaps 75 feet deep. In the center is a pond of yellowish water and around the margin are sheds containing piles of white, crystallized soda. This depression is not more than one-fourth of a mile across. (See engraving of Little Soda lake, first page.)

Continuing a little distance in a northeasterly direction the larger crater is soon seen. (See engraving of Soda lake, first page.) It is fully one mile across and more than 100 feet deep. It is occupied by a beautiful sheet of water, set in a rim as perfect and symmetrical as though it had been shaped by hand.

The water is shallow and intensely alkaline, although around the margin there are springs which are fit to drink. On the south side are the buildings of the company which is engaged in extracting soda from the waters. The usual method of separating the soda is employed. Ponds are made by raising embankments to separate portions of the water from the main body, and the water in them allowed to evaporate until the soda separates out as a thin layer over the bottom. At the time of my visit a new mill had just been put up for the purpose of refining the product before shipping it.

The great interest attaching to these lakes is their peculiar formation. Although the rims about the lakes are but slightly raised above the surrounding desert, the shape of the depressions is such as to make it clear that they were once the seat of explosive volcanic agency. No lava ever flowed from them, but over the surface of the region around there is a thick layer of fine ashes or pumice, while about the immediate rim there are most perfect specimens of volcanic bombs. Masses of liquid lava were hurled in the air and in many cases they were yet viscid when striking the ground, for grains of sand are imbedded in them.

Many craters of this kind occur to the westward about Mono lake, but nowhere, except in Oregon, do I know of any as large or as perfectly formed.

THE London Daily Mail says that since Johannesburg became the premier gold-producing field in the world the Americanization of the town and its surroundings is noticeable. Our veracious English contemporary declares that the Kaffirs talk with a strong New York intonation and "the casual talk of the mines is redolent of California rather than of Cornwall. The shops are full of the latest and best American machinery, run by American experts and erected by some of the cleverest mechanicians in the world. The assayer hails from Grass Valley, the cyanide man has put in his time at the Alaska–Treadwell, the chlorination superintendent used to be a cow puncher, and the battery man is more at home in San Francisco than in Johannesburg. Owing to the tact and ready resources of the Californians, everything worked with the utmost smoothness."

MINING SUMMARY.

ALASKA.

At Cape Nome all lines of supplies, except dogs, are reported plentiful. Lumber is $250 per M. feet; 100 pounds, a single sack, of coal, costs $50. A letter from Cape Nome says: "Bonanza district has been lit on as by grasshoppers, and now there is a grand rush for Koksadapagra. The big excitement is at Milk Creek, fifteen miles above Prince of Wales. York is attracting a big lot of attention, and good results are shown. Above Cape Rodney is the latest, called New El Dorado district. The trail is hot with people for this district. There will no doubt be a big stampede for Norton Creek, as $14 a pan is secured. Other creeks yield 10 and 15 cents at the surface. The beach is being worked with good results, and coarse gold at times shows up."

ARIZONA.

GILA COUNTY.

At Globe the Old Dominion mine and mill have been closed down and 230 men discharged. Only twenty men have been retained to work on the Continental property, which was recently purchased by the Old Dominion for $70,000. Difficulty in getting coke is the reported cause of the temporary cessation of work.

A later report says: "Old Dominion ore is abundant and plant is in good shape; 175 men have been laid off; 125 men are now working. The smelter has no coke, but will resume when supply arrives."

The Kasser is now the only producing gold mine in Globe district. The Supt. is J. E. Davies.

GRAHAM COUNTY.

Mgr. Colquhoun reports that in the years from 1893 to 1899, inclusive, the production of the Arizona Copper Co. has risen from 3928 tons to 9681 tons. Taken in percentage, the production of 1899 represented 246.46 as compared with 100. Taking the profit of 1893 as 100, that of 1899 was 1524.8. Taking 1895, when things had begun to improve, the profit was 249. Taking the cost per ton of 1893 as 100, the cost of 1899 was 96.5. Taking the price per ton in 1893 as 100, the price in 1899 was 144.4; but taking the profit of 1893 as 100, the profit per ton in 1899 was 618.95. The pressure put on the works has had the effect of wearing them out more rapidly than they were prepared for, and the company is reserving $225,000 out of the revenue of 1899 and will retain $200,000 out of the revenue of the current year. A dividend for the year of $1.87 per share has been declared.

The Detroit Copper M. Co. at Morenci now employs nearly 500 men. The completed concentrating plant has a capacity of 500 tons daily. There are in place six 125 H. P. gasoline engines, which furnish the power to run the concentrators, crushers and furnaces. The matte is converted by a pneumatic process. The daily output is from twenty-eight to thirty-five tons of bar copper, 98 fine. The company proposes to build a railroad to Guthrie, on the Gila river, connecting with the Arizona & New Mexico Railway, nineteen miles in length.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—The Shenandoah M. Co., of San Francisco, T. J. Parsons, Pres., has an encouraging strike in the Easton mine, the south extension of the old Red Cloud, two miles north of Plymouth.

On the 200-foot station of the new incline, the south level, 100 feet in length, exposed a 16-foot vein. Of this, the hanging and foot wall portions assayed from $6 per ton upwards. The incline was deepened to 375 feet, the vein leaving the incline below the 200-foot station. A 34-foot crosscut to the west (foot wall side) failed to show the vein, excepting a seam. Crosscutting from the incline, 8 feet east, 5 feet of good ore was discovered. Of this, the assay certificate of an averaged sample gives $57.88 per ton in free gold and 2% of sulphides assaying $218.39 per ton= $4.36 per ton of ore.

Plymouth, March 20.

At the Royal Consolidated mines, at Hobson, the shaft is down 940 feet, working on a large vein. Forty stamps are dropping and a site is being graded for eighty more.

CALAVERAS COUNTY.

Near Angels, the Big Bonanza mine, under the ownership of the Oriole M. & M. Co., has resumed operations. F. E. Dunlap is Mgr.

At Campo Seco, W. W. Cook is about to put a 10-stamp mill on his mine.

EL DORADO COUNTY.

(Special Correspondence).—At the German mine mill and hoist are run by water, there being 320 feet fall at the former and 280 feet at the hoist. The mill has ten stamps, a vibratory amalgamator, and shaking table. Ten additional stamps will be put in this year. Forty tons are daily crushed. The ore comes from the 300 and 400-foot levels. A station is being cut at the 500 level. The ore runs from 2% to 6% sulphurets, and these are sent to Selby's. The ledge is from 3 to 15 feet in width. At the hoist the engineer's levers are at the collar of the shaft, instead of being near the engine, as in most cases. Ingeniously contrived speed indicators of "home manufacture" are attached to the mill water wheel and to the vibratory amalgamator. C. O. Richard is superintendent and president of the company, G. M. Thomas foreman, Jas. Liddicoat foreman of mill. About twenty-five men are employed.

The Union or old Springfield mine, three miles south of El Dorado, was formerly owned by Alvinza Hayward. Upon a diminution in its output he ordered the mine closed down, pumps to be pulled out and work to cease. It remained idle until three years ago, when Harpending, Williams and associates bought it. It has repaid the purchase price for itself and other claims, paid for all improvements and left a surplus for its owners. There are six rich shoots of ore already exposed in the company's property, and three of these as yet have hardly been touched. Besides the 10-stamp mill at first erected, a second 10-stamp mill is nearly completed in another location. The property is about to be surveyed and mapped, after which a general plan will be decided upon for an extensive development of the widely separated ore shoots and the intervening ground. It promises to be a large proposition. A. P. Harpending is superintendent, C. C. Cantrell mine foreman, W. Taylor foreman of the mill. About fifty men are employed.

The Larkin gold mine, Diamond Springs, has been worked about four years by the present company. The vein is 4 feet wide—quartz, ribbon rock and slate intermingled. The entire ledge is run through the mill. There are ten stamps in the mill and two concentrators. The ore runs 1½% to concentrates, which are sent to Selby's. A cyanide plant is projected. From working tests already made Supt. Jacobs is satisfied the sulphurets can be treated successfully. Three tons of ore to the stamp are crushed each twenty-four hours. At the hoisting works a single reel hoist is used, which will do the work to 1000 feet depth. The vertical shaft is 600 feet deep. A double set of boilers of 150 H. P. capacity furnish steam for all purposes. The engine for the stamps is 25 H. P. A small hoisting engine is rigged to run the Cornish pump, which raises water from the 200-foot level, it being forced to that level from below by jackhead pump. G. B. Jacobs is superintendent, W. E. Jones mine foreman, F. Walker surface foreman. On the average thirty-five men are employed.

The Griffith Consolidated gold mine, one-half mile from the Larkin, is idle since Jan. 1st. This property is equipped with the best of modern machinery and at one time gave promise of developing into a dividend-payer, but its owners were disappointed in the returns and ceased work, with the shaft but 750 feet deep. There is here as complete an electric plant as can be found in the State, the company having its own electric power house on the Cosumnes river, five miles distant. Eight claims are consolidated in this property. The ledge is 10 feet wide, low grade. Only two of the claims, the Griffith and Royal, have been developed, or even prospected. The property is owned by a Scotch syndicate, who also own the Jumper mine in Tuolumne county. About seventy-five men were employed when the mine was running, with Jas. Richards superintendent.

The Ribbon Rock and Tin Cup mining claims are near the Larkin at Diamond Springs. They are being prospected by E. A. Davis, who represents Alvinza Hayward. The latter has a bond on the claims. They are old locations, both on the same ledge, but little work has ever been done on either. Fifteen men are employed, J. H. Kelly foreman.

In the Big Canyon mine, five miles from Shingle Springs, the underground workings go down 745 feet, 200 feet vertical shaft, at the bottom of which a crosscut runs 70 feet to the ledge, where the second shaft is 545 feet deep. The hoist at the surface is run by water power and the air compressor is also direct connected to water wheels. The 30-stamp mill is run by water under 345 feet pressure; at the hoist the pressure is 365 feet. The ore runs 3% sulphurets, which are treated at the company's own chlorination works. Ninety tons of ore per day are put through the mill. Work was suspended last summer on account of scarcity of water, but operations were resumed Nov. 18th, '99. From forty to fifty men are employed, E. T. Kane superintendent, J. J. Kane foreman, Jesse Sell millman, Chas. Boarman assayer.

At the Vandalia mine, one-half mile from Big Canyon, the ore is worked dry in a revolving grizzly, being too gummy to be run through a roller mill; the ore is cyanided. It is so strongly acid that a percentage of lime (twenty-five to thirty pounds to the ton) is mixed with it before treatment. About thirty tons per day are now worked, but arrangments are contemplated to increase this to 100 tons. With a ledge 8 to 12 feet wide, prospected by three or four tunnels, there is a large reserve of ore blocked out. It can be stoped out from the tunnel levels to the surface. The motive power for the plant is supplied by two gasoline engines. C. E. Seymour and C. T. Staver, the owners, have been operating the property two and one-half years. They employ fifteen to twenty men.

The Crystal mine, near the Vandalia and Big Canyon, is bonded by E. L. Simpson and Boarman Bros. of Canyon, W. E. and Henry Kleinsorge of Sacramento. This is an old mine, somewhat prospected. A tunnel 450 feet long runs into the sidehill, tapping the ledge 100 feet below the surface. A shaft 170 feet deep on the ledge extends from this point. A new shoot has been struck from which ore will be taken for the mill. A 15 H. P. steam threshing engine furnishes motive power. The ore lately uncovered is expected to yield $15 per ton.

The Fisk is an old location near Placerville. Considerable has been taken out where the ore outcrops, and at other places the decomposed ore was sluiced off the sidehill with good results. A 5-stamp mill, run by water, has been started, and will work first the broken ore strewn along the hillside; later the levels will be developed by tunnels.

The Gentle Annie group of mines, one and one-half miles north of Placerville, consists of five parallel gold-bearing ledges, of which only the Gentle Annie ledge has been developed to any extent. Here there is a working shaft 400 feet deep, with 3000 to 4000 feet in drifts, and with upraises connecting different levels. But a small amount of stoping has been done, so that there are large reserves of rich ore. Proceeds from the same have largely paid for the development and plant. The latter consists in part of a hoist, run either by steam or compressed air—ordinarily the latter, the air compressor located at a favorable point 3700 feet from the hoist, where there is a vertical fall of 442 feet. The water first does service at the mill, under 160 feet fall, before being used at the compressor. There is a cyanide plant for the sulphurets, of which the ore produces from 4% to 5%. On account of the death of one of the owners of the property work is temporarily suspended. B. J. Parlow, one of the partners, has charge of the property, A. L. McAfee engineer and machinist.

The Melton mine is on the south fork of the American river, two and one-half miles from Placerville. The owner is dead. The property is in charge of an administrator. A company of miners has leased and is operating the mine and mill on a co-operative plan. The work proceeds with harmony and good effect. The ore, however, is low grade. The ledge is 30 feet wide, mineralized slate. A tunnel 700 feet long has been run into the sidehill, whence the ore has been taken. Little stoping has been done. The 15-stamp mill and the air compressor are run by water power. The sidehill is so steep that the sulphurets are taken to a wagon by pack mules. J. H. Fuller is foreman, Al Philbrook and G. O. Forbes millmen.

Considerable is being done in the gravel deposits near Placerville. One extensive enterprise is that conducted by a company of which ex-State Senator Chapman of Placer county is the manager. His is a drift mine, two miles from Placerville. A tunnel 400 feet long runs into the gravel channel. The material is closely cemented and is fed from the dump into a Dodge crusher. The gold is caught in an amalgamator, on the aprons, and in the sluices below the mill. There is an ingenious arrangement for utilizing the waste water which splashes from the wheel. It accumulates in a tank and periodically sluices the boulders from the trough into which they are thrown by the crusher. About 100 tons of gravel are daily worked. Another tunnel will increase the output. Forty men are employed. Parker Bros. and Jos. Swansborough have charge.

The Stone gravel claim, adjoining, is leased to four miners, working on the co-operative plan. They take the gravel from a tunnel and put it through a regular 5-stamp mill.

At Kimble & Pike's gravel claim, adjacent, forty men are employed. There are two tunnels tapping the channel at points 500 feet apart. The cemented gravel is run through a 10-stamp mill, after which the pulp runs over silvered plates, then over 60 feet of riffles, and then into sluices. This is a profitable proposition, and at present rate of operations will last at least five years, as the company own seven-eighths of a mile along an ancient river channel. The mill is run by water power. This claim is owned by Geo. W. Kimble of Placerville, who acts as superintendent, and D. B. Pike of San Francisco.

The Montauk Con. G. M. Co. is giving employment to nearly 100 men at its property in the northern part of El Dorado, near the North Fork of the American river, the boundary line between this and Placer county. Newcastle, Placer county, is the nearest railroad town, and the business of the mining company is largely done at that station. This mine was formerly known as the Zantgraft, an old location, and the only one of several owned by the company in its tract of 160 acres which has been developed. The ledge on the Zantgraft dips to the west at an angle of 45%. The walls are 4 feet apart, with 2½ feet of solid quartz. The ore contains an unusual percentage of silver. Last year the weight of silver recovered greatly exceeded that of the gold. Less than 1% of the ore in weight is contained in sulphurets, and these are shipped to Selby. The ore averages in value about $8 per ton. There are three other well-defined ledges on the property, which have never been developed. The shaft is 1100 feet deep, the skips in which are run by electric hoist, with a steam hoist in reserve. The 25-stamp mill is also run by electric power, the company having its own power plant on the opposite side of the river, half a mile distant. The North Fork Ditch Co. supplies the water for this plant. With stamps weighing 1000 pounds each, 7-inch drop, 104 times per minute, and using 20-mesh screen, the mill reduces four tons of ore to the stamp, or 100 tons per day. Hand drilling is the practise in the mine, the company having no air compressor and no fans. It is, however, a well-ventilated mine, this result being largely accomplished through a drain tunnel which taps the ledge at the 300 level. E. Goodwin is superintendent, A. J. Blackburn foreman, Walter Humphreys shift boss, J. Ralston millman, W. B. Hoag assayer.

Placerville, March 20.

FRESNO COUNTY.

The County Board of Supervisors will build a road to the copper mines of the Wabash and Copper King Companies.

NEVADA COUNTY.

(Special Correspondence).—Work conducted by the North Star Mines Co., Grass Valley, is on an extensive scale, and this continues to be one of the most interesting properties in the State. The work consists in the reopening of old and abandoned mines, and to the present point has demonstrated the correct judgment of the projectors now in charge. At the Stockbridge shaft, where the work of reopening began in 1896, and where much valuable ore has since been extracted, the shaft is now down to a depth of 1400 feet. Here sinking and drifting are constantly going on. At the North Star, where a depth of 2800 feet on the incline attained in former years has not been increased, a new shoot of ore has been uncovered by recent drifting, and this old property has taken on a new lease of life. At the Central North Star, where a vertical shaft was started in 1896 with the expectation of striking the New York Hill ledge at 650 feet, and the North Star ledge at 2000 feet or more, a depth of 1200 feet has been attained. At 645 feet the New York Hill ledge was cut, but drifting thereon has not been pushed to any great extent. Another ledge—not the North Star—has been cut recently, and this is reported to be quite rich. Sinking is going on as rapidly as possible. Within the past week a new pump with 30x18-inch cylinders has been installed, capable of throwing 600 gallons to the surface from a depth of 650 feet vertical. Smaller pumps do the work below that level. Power for the three shafts above named is generated at the compressor air plant on Wolf creek, distant from the Stockbridge 800 feet, from the Central shaft 1½ miles and from the North Star shaft about one mile. The air is reheated by use of petroleum as fuel, both at the Stockbridge and at the Central. At each of these shafts the compressed air is used to run the hoists, pumps and power drills in the mine; at the North Star it is used only for power drills, the hoists, pumps and mills being run by water. There are two large compressors at the Wolf creek power house. One of these, the first put in, is run by a Pelton water wheel, 18 feet 6 inches in diameter, and requires 304 H. P. from the wheel, which is direct-connected. The other compressor is of peculiar design and was originally run by water, but now by electricity. Water for the power house is brought 7070 feet in riveted steel pipe and delivered at the wheel under a head of 775 feet, or a static pressure of 335 pounds per square inch. As development progresses in the mines, constant additions are made to the already extensive plant of this company. It also adds frequently to its mining posses-

sions, having recently purchased the Granite Hill property, joining the Stockbridge claim on the south. It is proposed to work into the latter ground from the Granite Hill shaft. Ore reduction for all these properties is accomplished at the 40-stamp North Star mill, which is well designed and complete. As before stated, this mill is run by water delivered at the wheel under 280 feet pressure. A steam plant, with large boiler capacity, is in reserve for use in case of emergency. The North Star Mines Co. is managed by J. D. Hague; A. DeWint Foote, M. Am. Soc. C. E., is Gen. Supt.; Ab. Hall, foreman at Stockbridge shaft; Wm. P. Martin, foreman at Central shaft; Thos. Marshall, accountant for the company.

The Grass Valley Exploration Co. owns the W. Y. O. D. and other claims on Ophir Hill, less than one mile from town. Vigorous management characterizes the workings at the mine and mill. Formerly the entire plant was run by steam. Something over one year ago an 80 H. P. electric motor was installed to run the Gates rock breaker, the twenty stamps and seven 4-foot Frue vanners. This power having proven satisfactory, an electric plant has just been put in to run the Cornish pump, but the steam attachments will be kept in reserve. This leaves only the hoist and air compressor now run by steam. A modern double-reel hoist is used, which raises ore cars of 1½ tons capacity to the landing, 50 feet above the collar of the shaft, where an attendant runs them to the mill or to the waste dump, as may be required. The mill adjoins the hoisting works, making short transmission for the ore. A Gates sulphuret saving plant, with fourteen tables, has been constructed below the mill during the past year, and this part of the work is conducted with great thoroughness. The incline shaft at the W. Y. O. D. is now down to a depth on the ledge of 1500 feet. The mine is extensively opened by drifts at various levels, and is now one of the most remunerative properties in the Grass Valley district. J. R. R. Nuttall of San Francisco and the Weissbein Bros. of Grass Valley are leading stockholders; Mark B. Kerr, Supt.; H. Pengelly, foreman.

One of the most conspicuous things about the well-planned works of the Empire mine, Grass Valley, is the immense headgear, 90 feet high, supporting the ore bins. Here 1½-ton self-dumping skips unload their contents of ore into a bin provided with grizzlies, and the coarser stuff goes through a No. 5 Gates rock breaker with a crushing capacity of forty tons per hour. This rock breaker weighs 29,000 pounds. The double-reel friction hoist, run by water, is a beautiful machine. The bins for waste and broken ore are on the same level. The waste is taken to a semicircular dump; the ore goes by elevated tramway about 200 feet to the mill, where it is reduced by forty stamps and sixteen concentrators run by electricity. Below the mill is a Gates sulphuret saver, neatly housed and constructed. All of the buildings at the Empire are of ample proportions and of solid construction. In their picturesqueness, if not beauty, they are exceptional. The Empire is proving a grand producer of late years, having redeveloped a new shoot, struck in one of the lower levels. The shaft is 2500 feet deep on the incline. About 135 men are employed. W. D. Bourn of San Francisco is owner; Geo. W. Starr, Gen. Mgr.

The Empire Co. is continuing development work at the Omaha group of mines, purchased about one year ago. This group consists of five locations, viz., the Omaha, Hopkins, Lone Jack, Homeward Bound and New Homeward Bound, embracing 3698 lineal feet of vein and a surface area of sixty acres. Quite extensive surface plants are in operation at the Omaha and at the Homeward Bound. At the former there is an equipment of twenty-eight stamps and eight Frue vanners, also a strong hoist and a Cornish mill, all run by water. Here sinking and drifting are constantly going on. At the Homeward Bound fifteen to twenty tributers are at work, the ore being reduced at the Omaha mill, one-half mile distant. An elevated tramway connects the two properties. The hoist and pump at the Homeward Bound are run by electricity. The plant consists of a 5000-volt synchronous motor, 225-volt generator, 30 H. P. motor for the pump and two motors of 22 H. P. each for the hoist. The Omaha was a great producer in former years, having yielded $2,000,000. Its richest shoots have been worked out, but it is thought new ore bodies will be discovered under the present plan of development, backed as it is by ample capital.

At the Allison Ranch mine, three miles south of Grass Valley, the incline shaft is now down to a depth of 1300 feet, equivalent to 825 feet vertical. When this mine was reopened, in 1896, a 250 H. P. air compressor was put in, which was at first run by water and steam power applied to the same shaft. Within the past few weeks a mate to this compressor has been installed, it having been found necessary to furnish more power on the drills in order to continue sinking. The compressors will be run by electric power. Compressed air is used to run the Reidler pump, which throws water from the 400 level to the surface, as well as for the smaller pumps stationed at lower levels. The hoist is run by water power. No preparations have been made for the erection of a stamp mill, but there is some excellent ore in the bins, taken out while doing development work. It is locally thought there are reserves of ore that can be drawn upon when the time is ripe for its extraction. About fifty men are given employment in development work, under the superintendence of Robert Robertson, formerly of Amador county.

The enterprise near Grass Valley which is at present attracting most attention is that of reopening the old mines on Union hill, two and one-half miles east of town. About one year ago, Eugene Creller, formerly Supt. Idaho mine, organized a company embracing as stockholders Capt. Thos. Mein, Hamilton Smith, Henry Perkins, Henning Jennings, Albert Beit, besides Weissbein Bros., C. E. Clinch and other local people. Work has since begun at the old Union Hill shaft. There are five claims included in the organization—the Union Hill, Morning Dew, Lucky, Cambridge and Greek — with seventy-three acres embraced in the patents. Water has been piped from the South Yuba ditch, giving a pressure of 485 feet at the mine. Pumps were started and the old shaft—380 feet deep—was unwatered and retimbered where necessary to a depth of 180 feet. From this level drifts had been run 500 feet in each direction by former workers. At this point there was delay in getting the Cornish pump previously ordered, and the mine was allowed to fill with water. On the 15th of February last the new pump had been installed and pumping began again. The mine is now being rapidly freed of water, as the Cornish pump, the largest in the county, with a capacity of 25 miners' inches, is drawing from the 180 level, and two steam pumps of smaller capacity are also at work. The hoist, a double-reel, geared machine, and the pump, are set upon solid cement foundations. The crown wheel of the latter is 14 feet in diameter. The head gear for the hoist is 86 feet high. The mines in this group have an interesting history, and considerable is expected of them. The old Union Hill yielded $147,000 during its last working year; it sold $7000 worth of bullion during its last month, and its ore for a year averaged $14.73 per ton. The ledge is from 3 to 4 feet wide. The mine ought to pay well when worked under modern conditions, provided the ledges to be developed hold up in value. The property is in good hands, and will be intelligently and systematically developed.

Extensive improvements are under way at the Brunswick mine, on Union hill. The Cornish pump had been running to its utmost capacity to keep the mine free of water, and on the 5th ult., a break occurred in the crown wheel, which stopped work. Negotiations were opened with the Justice M. Co., and the massive Cornish pump used by that corporation at Gold Hill, Nevada, was purchased. The work of installing this pump is now going forward. Excavations have been made and concrete foundations laid for the machinery from 8 to 16 feet deep. The pump will be run by an 8-foot water wheel, but there will be an electric motor that can be resorted to in case of shortage of water. The crown wheel of the Justice pump weighs eleven tons. The rocking beam is to be 33x25 inches; the king post 35x25 inches, and 13 feet high. The line of plunger pumps in the mine includes a 14-inch at 400 feet; 12-inch at 700 feet, and a 12-inch at 1000 feet, which latter is the depth of the shaft. The friction hoist, run by water, has been converted from single to double, and the old gallows frame has been replaced by one 48 feet high, set on concrete foundations 10 feet deep. The shaft has been enlarged from two to three compartments, and straightened from the 300 level beyond the point where the inclination changes from 45° to 65° (400 level). This latter work was accomplished before the late break and while the mill was kept in operation. The mill contains twenty stamps, run by an 80 H. P. electric dynamo, while another dynamo of the same capacity runs an air compressor. The Brunswick stockholders are mainly New York people. Chris Mallon is superintendent; H. L. Body, chief engineer; C. H. Conlon, foreman. About sixty men are employed. H. G. P.

Nevada City, March 20.

PLACER COUNTY.

At the Morning Star drift gravel mine, Iowa Hill, the Colfax Sentinel says the working tunnel is in over 4000 feet and is below the gravel channel. As the gravel is mined it is dropped into cars through chutes. A daily average of 100 cars of gravel are mined. The average monthly payroll is about $4500. The partly cemented gravel is crushed in a 10-stamp mill.

SAN BERNARDINO COUNTY.

At Gold mountain Capt. DeLamar will build next month a 40-stamp mill.

Part of the machinery for Col. Ewing's 20-stamp mill has been brought up the Colorado river opposite Cottonwood island by the steamer from Needles. Searchlight ores will be hauled twelve miles thereto.

SAN DIEGO COUNTY.

Mgr. A. J. Smith of the Gold Crown M. & M. Co., at Picacho, near Yuma, will build a mill.

SAN LUIS OBISPO COUNTY.

Oil is reported struck fifteen miles east of Arroyo Grande, at a depth of 500 feet, the first strike in that county. The well will produce ten barrels daily.

SANTA BARBARA COUNTY.

The Southern Pacific Oil Co. at Summerland has struck a 100-barrel gushing well, 150 feet from the shore, 353 feet in depth. The region was illustrated on page 288 of last week's issue. This is said to be the finest well yet struck in Summerland, and seems a practical demonstration of the theory that an oil field is covered by the waters of the Santa Barbara channel.

SHASTA COUNTY.

(Special Correspondence).—As foreshadowed in the MINING AND SCIENTIFIC PRESS, Feb. 10th, the Afterthought copper properties, near Redding, have again been taken up, under a new bond, by A. H. Tarbet, Wm. McDermot and others of Butte, Mont. The latter has arrived at the mine and work begins forthwith.

At the Black Spider mine the methods of work have been changed to the contract system. An ore body of good grade is reported uncovered at 95 feet depth.

Work progresses on preliminaries for a large electric power plant here by a San Francisco company composed of C. L. Fair, Knight & Heggarty, C. L. Brown and others. The capitalization is $400,000. Several sites are under consideration, both on Pitt and McCloud rivers, previously noted. This company bears no relation to the local company.

At Bully Hill work is moving energetically and with system on the projected smelting plant under the management of T. H. Oxnam.

Encouraging discoveries have been made on the Stowell properties, being developed by the Mountain Copper Co. Diamond drills are in use.

Redding, March 22.

SIERRA COUNTY.

Messenger: The Kenton mine, Alleghany, will soon resume operations.——Mgr. F. B. Hill of the Oriental mine, near Alleghany, will put in a new pump and resume sinking.——Mgr. Garnier at the Osceola, near Alleghany, intends to erect a mill on the property this spring.——Mgr. Harper of the Harper mine, at Forest, will put in a pump.——T. A. Carson has an option on the Ante-Up and Brush Creek mines, and goes East next month.

SISKIYOU COUNTY.

(Special Correspondence).—J. H. Rice and associates of Grand Rapids, Mich., have started a 400-foot tunnel on a 12-foot vein of ore near Henley.

H. Mattern of Ashland, Or., has bought several more claims on Printer gulch and is developing them.

The old Black Jack and Blue Gravel will start again.

The old Sterling mine on Hungry creek has been started up after lying idle seven years.

J. Downing has found a $1900 pocket on Ash creek, where $10,000 was taken out three years ago.

Hornbrook, March 20.

(Special Correspondence). — The Gold Run group of gold quartz veins, on Knownothing creek, was discovered in '86, and has been since then worked continuously, yielding comfortable dividends. This remarkable, high-grade property has but four owners (a family concern), of which one is general manager and two others run the 10-stamp mill. The three constitute the official department, which, if not ornamental, has been and is successful. A winze being sunk in the lower tunnel, on one of the three pay ore veins, is now 65 feet in depth on a 4-foot vein.

Yreka, March 19.

TUOLUMNE COUNTY.

(Special Correspondence). — Near Big Oak Flat the Lillian mine has a vein averaging 4 feet in free gold and sulphurets, averaging $8 per ton.

The North Star mine, on the opposite side of the Tuolumne river, has a 2-foot vein averaging the same. These two mines are operated by the Mohican M. & M. Co. Both are tunneling propositions.

This district is in need of an electric power plant. There is a natural dam in the river two and one-half miles above the mouth of the North Fork of the Tuolumne river, which would afford ample fall for the plant to be placed at the mouth of the North Fork. At the driest season there is never less than 1500 inches of water at this point, and power could also be obtained from the North Fork as well.

There would be a demand for power from the Big Oak Flat, Groveland, Buchanan and Carter mining districts. Power would need be transmitted but five miles to reach the farthest point of any one of the districts named.

Groveland, March 20.

COLORADO.

ARAPAHOE COUNTY.

Denver smelters propose enlargement because of increase of ore supply beyond present ability to handle it.

BOULDER COUNTY.

W. P. Gillingham, Mgr. San Blas mine and mill at Ward, is busy on custom ore and will sink the mine shaft 300 feet deeper.

At Eldora, in the Mogul tunnel about 2000 feet from the portal and 1000 feet from the surface, Supt. Gilfillin has a pay streak of sylvanite 8 inches thick, value about $700 per ton.

CLEAR CREEK COUNTY.

Montreal men have bought the Consolidated Stanley mine, near Idaho Springs. The consideration is understood to be over $1,000,000. C. A. Gehrmann is Mgr. and part owner.

The Silver Leaf mine, at Freeland, has been sold to Milwaukee men for $30,000. J. W. Boyd will manage the property.

The Rising Sun mine, at Empire, has been bought by the Rising Sun M. Co. for $22,000.

The Courier at Georgetown has samples of tin ore from Devil's Head mountain, Douglas county, and Jefferson county.

LAKE COUNTY.

The Resurrection mine, Leadville, is being examined on an option given to an English company for $3,000,000.

From Leadville is monthly shipped 4000 tons zinc ore concentrates to Germany via Galveston. The zinc by-product permits the profitable working of such mines as the Iron-Silver property, of which T. E. Schwartz is Mgr.

MINERAL COUNTY.

T. G. Saunders figures that at Creede in spite of the low price of silver it pays better to mine silver ore to-day with silver at 60 cents per ounce than it did eight years ago with silver at 90 cents.

MONTROSE COUNTY.

W. Wilson of Grand Junction tells the Miner of a surface uranium deposit in the northern part of the county. The ore is chalky in character, and, according to analysis at Golden, contains 29% uranium. He sent 1400 pounds of the ore to Denver, for which he got $1.25 per pound for the metal in the ore, receiving a little over $500.

OURAY COUNTY.

At Bear Creek, C. H. Nix proposes an electric plant to generate 20,000 H. P. and furnish light and power to mines about Ouray, light for the city of Ouray and motive power for the electric road which O. Mears proposes to construct to Ironton.

SAN JUAN COUNTY.

At Silverton the Silver Lake M. Co. has 225 men at work.

The Unity tunnel is 400 feet lower than any other local workings, the ore averaging $20 per ton; 200 tons of ore are put through the mill daily—about fifty tons of concentrates every twenty-four hours.

The San Juan M. & D. Co., a California concern, is operating on Hazelton mountain.

The Sultan Mountain S. & M. Co. has let a 200-foot contract on the crosscut tunnel to cut the King and Grand Turk veins.

SAN MIGUEL COUNTY.

At Ophir the San Juan G. M. Co. has its new cyanide plant at the Bessie in operation, daily treating 200 tons ore. It is 125 feet from the mouth of the Black Hawk tunnel, which will in time connect all the properties with the mill. A 2400-foot tram conveys the product to the mill. There are two solution tanks, 20 feet in diameter, 10 feet deep; six leaching tanks, 30x6 feet; two settling tanks, 15x10 feet; two sump tanks, 15 and 20 feet in diameter by 10 feet deep. A 100 H. P. electric motor furnishes power.

SUMMIT COUNTY.

The low-grade sulphide ores of Frisco district are to be treated. The plans are drafted for a matte furnace at Frisco with an initial capacity of 200 tons per day.

TELLER COUNTY.

J. Dern of Mercur, Utah, is reported to have control of the Union G. M. Co. of Cripple Creek. The deal is said to represent a cash consideration of over $300,000. Utah papers deny the truth of the report.

The Advance G. M., B. & L. Co. is lo-

cally credited with the purchase of the Golden Wedge, on Raven hill, for $35,000.

Cripple Creek reports that this season seven new or enlarged reduction plants will be ready to operate on ore from that district with a total capacity of 1320 tons. The list includes the Union Gold Extraction Co., chlorination, at Florence, daily capacity 250 tons; National Gold Extraction Co., cyanide, Florence, addition to present plant, 110 tons a day; Colorado & Philadelphia Reduction Co., chlorination, Colorado City, addition to present plant, 110 tons a day; Metallic Gold Extraction Co., cyanide, Florence, addition to present plant, 100 tons a day; Economic Gold Extraction Co., cyanide, Eclipse, 300 tons a day; Brodie mill, cyanide, Cripple Creek district, 50 tons a day; Tutt & Penrose mill, chlorination, Colorado City or Florence, daily capacity 400 tons.

IDAHO.

ELMORE COUNTY.

In the Bascom mining district, sixteen miles from Rocky Bar, on the South Boise river, a 10-stamp mill will be put on the Gold Lion property by J. A. Nicholson.

OWYHEE COUNTY.

Supt. Irwin, in charge of the tunnel company boring under old War Eagle mountain, four miles from Silver City, is reported by the Avalanche to have an extensive plant. The tunnel is in 750 feet and is pushed 9 feet every twenty-four hours. The formation is a blocky granite. Three eight-hour shifts are employed. The tunnel is 6x7x7½ feet in the clear. The car line is single track, 24-inch gauge, laid with twenty-pound rails. Alongside is a drain about 20x30 inches cut in the floor. The tunnel is designed to open and drain the old Chariot ledge, and will have a length of 6300 feet. It will cut the vein 2200 feet below the surface, 800 feet below the deepest workings.

NEVADA.

LINCOLN COUNTY.

(Special Correspondence). — The Mayday, at this place, twenty miles west of Pioche, is developing with a force of thirty men, preparing for silver and copper production. This was a heavy producer in earlier years. It belongs now to Bybee & Savier.

Bristol, March 15.

STOREY COUNTY.

The returns of the bullion product of the Consolidated California & Virginia mine for January and February, 1900, from low-grade ore crushed and concentrated at the Kinkead mill, are as follows:

Ore worked, 1002 tons. Selby Company's assay value of ore concentrates—gold, $4425.55; silver, at 129.29, $2160.95; total, $6586.50; bullion bar, $167.97; silver, at 129.29, $6.86; grand total, $6761.33.

Bullion yield, per ton—Gold, $4.58; silver, $2.16; total, $6.74.

Assay value per ton, per battery samples—Gold, $4.68; silver, $3.88; total, $8.56.

Yield per cent, per battery samples—Gold, $9.79; silver, $5.56; aggregate, $7.87.

Assay value of the ore per ton, shipping value—Gold, $5.86; silver, $4.88; total, $10.56.

The concentrates from the above ore, also one bullion bar gained from settlings, were shipped to the Selby Smelting & Lead Works for treatment.

Settlement — 562 sacks concentrates, gross weight, 39,730 lbs.; tare on sacks, 690; moisture, 991 lbs.; net weight, 38,739 lbs, equal to 19 tons and 739 lbs.

Contents of concentrates—Gold, $4425.55, equal to 214.086 ounces at $19.50 per ounce, or $4174.68; silver, $2160.40, or 1671.40 ounces, less 5%, or 8357 ounces 59⅝c per ounce, $946.74; total contents, $5121.42.

Value of bar of bullion—Gold, $167.97; silver, $2.92; total, $170.89, making total value, including contents of concentrates, of $5292.01, or $5.28 per ton of ore.

Expense — Comstock Tunnel royalty, $203.10; crushing and concentrating ore, $2129.25; railroad freight on concentrates, $197.64; railroad freight on empty sacks, $1.38; hauling, 50 cents; hauling concentrates, $14.99; Selby Company's working charges, $213.06; Selby Company's discount on bar, $1.58; total expenses, $2761.50, or $2.75 per ton of ore. Net proceeds in gold coin, $2530.81, or $2.52 actual net profit per ton of ore.

NEW MEXICO.

BERNALILLO COUNTY.

The power plant of the Cochiti G. M. Co. at Bland approaches completion. The flywheel is 20 feet; the shaft upon which it turns is nearly 2 feet in thickness, weighing 40,000 pounds. The boilers will be six in number, 18 feet long and 70 inches in diameter. F. W. Hart is Supt.

The present population of Bland and vicinity, including the Albemarle camp, is estimated to be 3000. In the mines, mills and lumber camps 1500 men are employed. The Cochiti G. M. Co. is locally credited with intention to have its 800 H. P. electric plant and its enlarged mill in operation by May 1st, and then begin to treat 300 tons of ore daily. By June 1st the Navajo Co. is to have its electric tramway of one mile and its new 350-ton mill under way: R. W. Woodbury of Denver paid $50,000 for the Iron King mine; the ore is to be treated at Woodbury.

SANTA FE COUNTY.

L. Lewisohn of New York has sold to the Santa Fe G. & C. M. Co. the Santa Fe group of copper mines in this county for $750,000. There are sixteen mines in the group.

OREGON.

BAKER COUNTY.

"A solid mountain" of nickel, going $30 to the ton, is reported found at Rye valley, twenty miles from Baker City.

UTAH.

BEAVER COUNTY.

(Special Correspondence).—Beaver Lake District: The Copper Mountain mine has a 200-foot shaft and has shipped a car of copper ore.

The Skylark tunnel is progressing and on the property is a fair showing of copper.

The O. K., patented, has a 240-foot shaft and is being further developed. This was bought years ago by A. G. Campbell of Salt Lake City. The O. K. Extension is also developing. It has a whim over a 90-foot shaft and consists of eleven claims.

The F. W. group of nine claims parallels the O. K. and has some development. It belongs to Kelley, Brock & Covert. A vein is exposed, showing 3 feet of copper sulphides.

A conservative estimate of the copper found in Beaver Lake prospects places it at an average of 8%.

Rocky District: This is four to five miles west of Milford. The Glasgow & Western Co. have twelve claims here, all patented, on which a ledge of great width has been exposed by an open cut. A number of shafts have been sunk. Several cars of ore have been shipped from the group to their smelter at Golconda, Nev. The last shipment is said to have run 34% copper, $8 gold and thirty-two ounces silver.

The Copper Ranch, owned by Murphy & Prebble, includes seventeen claims, on which a copper ledge is being developed. A crosscut is being run to cut the ledge at greater depth.

The Old Hickory, owned by Green & Austin of Kansas City, has been bonded. This property has shipped considerable copper ore.

The Apex belongs to John Forgia of Milford and has a 50-foot ledge, as shown by surface work.

The Maggie Williams, comprising four claims, belonging to W. D. Williams, has a copper cropping that is promising. A tunnel is being run to cut the ledge at greater depth.

Star District: This is a lead, silver and gold district, seven miles west of Milford. The Rebel group, belonging to Cullen & Ryan, in former years shipped many thousand dollars' worth of silver-lead ore. It is well developed.

The Old Hickory, south of the Rebel, owned by A. G. Campbell and others, comprises seven claims and has been bonded to Col. Altman and A. B. Lewis of Chicago. It is all patented ground, which in former years was a heavy producer of silver, lead and gold.

The Vicksburg group, owned by Tatum Bros. of Philadelphia, worked steadily during the seventies, at which time it operated a smelter on the ground.

The Foothills, owned by Angus Buchanan and Hays Cook, has a fair showing of development and ore.

The Copper King, belonging to Forgia Bros. of Milford, is being developed.

The Elephant mine, patented property, is said to have produced $250,000 in gold, silver and lead. Since 1885 it has been worked only by "chloriders."

The Mammoth is owned by M. Cullen of Salt Lake City. In the seventies it produced ore of the value of $200,000. It is worked now by leasers.

The Orphan Boy group is developed by several shafts and is running a tunnel 200 feet on the vein. About $17,000 was taken from the surface. It is owned by W. D. Williams of Milford.

The Burning Moscow belongs to Cullen & Barrett and has considerable development. The vein uncovered yields 60% lead and as high as 200 ounces silver.

The Star district is said to have produced $10,000,000 from 1870 to 1886.

The Cave mine, nine miles southeast of Milford, was one of the heavy producers in earlier days. The rich carbonates and chlorides of silver were found exposed in great caves. Lessees have of late years made good money out of the property.

The Rollins, in the Lincoln district, fourteen miles southeast of Milford, has a steam hoist and is preparing to resume work. It was a large producer in former years. The ores are silver, lead and gold.

There is some activity in the Antelope district, fifteen miles northeast from Milford. The Caterpillar group of four claims has been worked for six years, producing a good grade of copper. There is likewise good development on the Moody group, and Bostwick & Co. are opening a property in the same locality.

WASCOTT.

Milford, Utah, March 14.

(Special Correspondence).—The Imperial, an extension of the Horn Silver, will be developed under a new organization in which Eastern people have a large representation. The property takes in about 400 acres.

Frisco, March 16.

IRON COUNTY.

(Special Correspondence).—Detroit capitalists have purchased a controlling interest in the Ophir mine at this place. The Ophir M. & M. Co., holding title to the property, have an ample treasury fund for further development. The erection of a mill is one of the contemplated projects a few months later.

Stateline, March 15.

JUAB COUNTY.

(Special Correspondence).—The Swansea at Silver City is shipping from 1000 to 1500 tons of silver-lead ores per month to the smelters. It is a good fluxing ore, carrying considerable iron. Most of the production comes from the 750-foot level, although the workings extend to 850 feet depth. Considerable water is encountered here, requiring pumping.

Silver City, March 17.

(Special Correspondence). — The Sunbeam mine, near Silver City, was ordered closed down by the board of directors on the 16th inst., on account of the operations not being profitable. The proposition of sinking below water level will be considered later. Mgr. Buckbee has resigned.

Silver City, March 17.

TOOELE COUNTY.

(Special Correspondence). — The West Argent group of five claims is working through a 600-foot shaft and shipping 100 tons of ore per month to the smelters, averaging 40% lead and 40 ounces silver. A level is run at each 100-foot station, on each of which there is ore. It is estimated that they have 20,000 tons of medium-grade ore blocked out, and the intention is to erect a concentrating mill. Chiefly interested are J. F. Connor, J. A. Brown, J. W. Perrin, F. R. Ball and T. Jacobson.

Stockton, March 16.

(Special Correspondence).—The Overland Co., whose mine and mill are at Sunshine, have elected a new board of directors and authorized an issue of $150,000 in bonds to be sold, the proceeds to pay off the company's indebtedness, further develop the mine and enlarge the mill. The directors are James A. Simpson, Denman Blanchard, W. B. Ferguson, of Massachusetts, J. A. McDougall, A. L. Robinson, W. S. McCornick, G. A. Duncan, of Utah.

Mercur, March 18.

SALT LAKE COUNTY.

(Special Correspondence).—W. A. Fourness, M. E., of Salt Lake City, has prepared plans for a new smelter to be erected at that place, of 800 tons daily capacity. The formation of a company for this project is said to be complete.

WASATCH COUNTY.

(Special Correspondence).—W. H. Hackney and W. E. Vigus, of Salt Lake City, have located a group of claims near Soldier's Summit, on which is an extensive ledge of oil shale, showing by analysis 8% light and heavy naphtha, 2.5% light burning oil, 3% heavy burning oil, 14.1% paraffine oils, with residuum of 79.6%. They believe the paraffine properties in the shale justify development.

Soldier's Summit, March 19.

WASHINGTON.

FERRY COUNTY.

At Republic the Mountain Lion 20-stamp mill is ready for work. The cyanide process will be used. J. S. Wyatt is Mgr.

FOREIGN.

BRITISH COLUMBIA.

At Rossland the Miner says miners are leaving for Butte, Cripple Creek, Sumpter, the Cœur d'Alenes, Cape Nome and other points. They say they do not care to lose their time while waiting for an adjustment of the differences that have arisen. They could go to work elsewhere, and there would be no question of contracts, and they would be paid for a day's work when they had done one. S. Curtis, Minister of Mines, is there endeavoring to reconcile the mine owners and miners so as to bring the labor troubles to an end.

Personal.

J. F. LANG is Supt. Black Spider mine, near Keswick, Cal.

J. S. WILBUR is Supt. Gray Eagle mine, Gold Point, Sierra county, Cal.

W. W. MATHER of the Plumbago mine, Sierra county, Cal., is in San Francisco.

GEO. KISLINGBURY has returned from Honduras, C. A., to Shasta county, Cal.

W. R. BEALL, Supt. Cleveland Consolidated Mines, Ono, Cal., is in San Francisco.

W. A. FERGUSON goes as electrical engineer with the Moctezuma Copper Co., Nacosari, Sonora, Mexico.

H. B. UNDERHILL, Sec'y Selby Smelting & Lead Works, has returned to San Francisco from Honolulu.

WM. MCDERMOT of Butte, Montana, is in Redding, Cal., to start work on the Afterthought copper property.

J. T. MCCARTHY has been appointed Gen. Mgr. and Supt. Klondike, Cripple Creek & Galena M. Co., Victor, Colo.

F. A. C. PERRINE, formerly of Stanford, Cal., now at Trenton, N. J., has been elected Pres. Stanley Manufacturing Co., Pittsfield, Mass.

E. D. BOYLE, formerly Supt. Alta mine, Gold Hill, Nevada county, Cal., has resigned to take charge of the Franklin mine, Willow Valley, Nevada City, Cal.

STATE MINING INSPECTOR H. A. LEE of Colorado requires a $20,000 bond from the Paris Exposition Commission for the safe return of Colorado's collection of mineral specimens.

A. EKMAN leaves San Francisco for Paris next week, where, during the Exposition, he will have charge of California's State mining exhibit. His address will be 8, Place de l'Opera.

F. A. GOURLAY of Sierra county, Cal., and J. H. Cunard of Nevada county, Cal., sailed on the 23rd for eastern Chinese gold fields, where they will have charge of a hydraulic mine.

CHAS. C. DERBY, Supt. New Almaden quicksilver mine, New Almaden, Cal., goes to Korea on the 7th prox. to examine some mining property. Mr. Derby expects to be absent from California about six months.

Industrial Notes.

—A box car that cost $457.17 in 1898 now costs $583.25; a locomotive costing $11,756.92 in 1898 now costs $14,497.99.

—For the seven months from July 1st, '99, the Southern Pacific Co.'s total operating expenses were $23,957,842, and total earnings in excess of operating expenses $14,209,895.

—There were recently shipped hence 1000 tons of wire nails to China on one steamer and 990 tons to the same country on another steamer. Within thirty days 1470 tons of wire nails were shipped to Japan. In December 1117 tons of wire were shipped to Australia.

—During the year 1899, according to Treasury statistics, Mexico bought from the United States $29,213,627 of machinery, steel, iron and other metals, as follows:

Agricultural machinery	$7,642,942
Electric machinery	254,955
Copper manufactures	710,053
Zinc manufactures	2,553,685
Telegraph wire	214,633
Rails	1,721,743
Divers vehicles	366,342
Metals for manufactures, iron, steel, etc	15,652,919
Bicycles	96,355
Total	$29,213,621

Catalogues Received.

THE Edward P. Allis Co. of Milwaukee, Wis., has just issued a very complete and handsome catalogue of "Power Transmission Machinery," such as gears, pulleys, shafting, etc., which will be sent free on application.

CATALOGUE NO. 1 of the 1900 series, issued by the Risdon Iron Works, San Francisco, is devoted mainly to discussion and description of engines and boilers, embracing the latest in that line. The tables and specifications afford opportunity for determining from local conditions just what is needed. There is a detailed illustrated description of the Heine patent safety boiler with the names and addresses of many Pacific coast users of that boiler. The catalogue will be sent on application to any address.

OF the Fraser & Chalmers' series four are received this week, the 9th edition of No. 6, "The Comet Crusher;" 7th edition of No. 7, "Perforated Sheet Metal;" No. 54, "The Sederholm Boilers;" and 9th edition of No. 4, "Gold and Silver Mills," any or all of which will be sent upon re-

quest addressed to W. 12th St. and Washtenaw Ave., Chicago. The last named is an unusually complete treatise of over 250 pages, with illustrations and technical description of various processes and the machinery and apparatus considered to be best adapted thereto.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING MARCH 13, 1900.

645,074.—WRENCH—C. C. English, Hood River, Ogn.
645,168.—GAS BURNER—J. P. Farmer, Portland, Ogn.
645,356.—LEAD PENCIL—A. D. Foster, Oakland, Cal.
645,470.—WATER TOWER—H. H. Gorter, S. F.
645,228.—GRAIN CLEANER—J. M. Lasswell, San Miguel, Cal.
645,533.—CONCENTRATOR — J. Mauldin, Sacramento, Cal.
645,531.—EVAPORATOR—A. P. Merrill, S. F.
645,229.—TRAVELING TARGET — H. L. Moller, S. F.
645,213.—SASH LOCK—H. U. Prindle, Woodland, Cal.
645,536.—ENGINE FOR ROCK DRILLS—P. H. Reardon, S. F.
645,537.—HOSE COUPLING—P. H. Reardon, S. F.
645,300.—OFFICE INDICATOR—C. V. B. Reeder, San Jose, Cal.
645,188.—SEPARATOR — F. A. Rider, Vekal, Ariz.
645,132.—ROTARY ENGINE—M. J. Robinson, Los Angeles, Cal.
645,219.—BORING DRILL—C. S. Stafford, S. F.
645,221.—WATER WHEEL—S. J. Tutthill, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

REFRIGERATOR CAR.—John Zobrist, Hanford, Cal., assignor to the John Zobrist Refrigerator & Ventilator Co. of same place. No. 644,268. Dated Feb. 27, 1900. The object of this invention is to provide cars for the transportation of perishable fruits and like goods, and means for keeping them continually cooled. The car has vertically disposed ice chambers at opposite ends, hermetically closing doors in the roof through which ice may be lowered into the chambers. These chambers have open work walls surrounding the ice chamber, and an annular air passage exterior thereto. A second open or network wall outside of the air chamber serves to retain the body of salt which is packed into the space exterior to the network wall, and between it and an outer closed casing. A lining extends across the top of the car and from end to end, forming a passage between it and the roof, with a central opening communicating with the interior of the car, and openings at the ends communicating with the air passages surrounding the ice chamber. A passage is formed along the center of the floor of the car around and over which the boxes are packed and openings are made between the opposite ends of this passage and the lower ends of the refrigerator air chambers. Revoluble fans are so disposed that the air will be caused to circulate through the refrigerating chambers and thence through the bottom passage, and through the car by means of the passages formed by the piling of the boxes or packages of merchandise within the car.

SNATCH BLOCK.—Walter W. Bouse, Aberdeen, Wash. No. 644,729. Dated March 6, 1900. This invention relates to improvements in snatch blocks, and it consists in the novel construction of a shell formed of cast steel or forged plates, one side being made in two parts with a hinge portion. The hinge pin is located below the line of curvature of the pulley rim where it crosses the open space, and converging so as to form an essentially continuous curve at the lower part of the shell. The upper part is slotted and through the slot passes a latch, with means for connecting it with the opposite side when the block has been closed. The lower shell is rigid, with a hollow pin of large diameter upon which the sheave turns, and this pin is provided with a means for containing and gradually discharging the lubricant within the sheave. It is also so fitted as to lock the two sides of the shell together.

METALLIC LIFEBOATS.—Wm. S. Ray, San Francisco, Cal. No. 644,723. Dated March 6, 1900. This invention relates to improvements in the construction of life and similar boats. In the usual construction of metallic boats they are formed of a number of sheets of metal overlapped and riveted together to complete the sides, and these sheets are then secured to wooden keels and have wooden runners fixed to the top. In addition to this a number of ribs or braces are necessary to give the boat thus constructed the requisite stiffness. These parts fitting closely against the metal gather moisture, which tends to rust and eventually destroy it, besides preventing access for the purpose of painting, etc. In this invention the boat has the sides each formed of a continuous single sheet of shaped metal, and a keel and stem and stern post formed of a single piece of metal, to which the boat sides are secured, gunwales being formed of segmental strips secured upon the upper edges. Interior to the boat are air tanks following the interior curvature of the sides, and these serve as supports for the thwarts and transverse containing compartments which are formed underneath the thwarts. Air chambers are also formed in the ends of the boat, and the intermediate parts are all supported out of contact with the inner sides, and are all removably secured in place.

SELF-LEVELING GRAIN CLEANER.—J. M. Lasswell, of San Miguel, Cal. No. 645,228. Dated March 13, 1900. The object of this invention is to provide a means by which the cleaning apparatus of traveling harvesters may be kept level transversely, and at the proper inclination longitudinally without reference to the tilting of the machine as it passes over the ground. It consists of shafts extending transversely across the screens about midway between the ends, so that the screen is fulcrumed thereon to tilt longitudinally. A crank arm is journaled in the sides of the machine and connected with one end of the screens, and weights depending from the ends of the shaft act like a pendulum to swing the shaft and correspondingly tilt the screens so that they are kept level in that direction. A second weight is suspended, and is so connected with the screens as to be vertically slidable, in side bars so that the screens will also be leveled by the transverse swaying weight whenever the machine tilts to one side or the other.

TRAVELING TARGET.—H. L. Moller, San Francisco, Cal. No. 645,229. Dated March 13, 1900. This invention comprises an endless track or runway with changes of direction, gears adapted to travel upon the track and means by which they are propelled, and a means for engaging and disengaging the gears with the propelling devices; a target of any description carried upon the car, a protecting wall by which the gears themselves are concealed, while the target projects above the wall so as to be in view of the marksman at the shooting stand. The target is so supported that when it is struck it will fall, and guides are so arranged with relation to it that it will afterwards be restored by them to its normal position. Brushes are also located in the path of the target by which the previous marks upon it will be obliterated.

Commercial Paragraphs.

R. G. HANFORD of San Francisco has ordered a placer testing outfit from the Keystone Driller Co., for use at Rocklin, Cal.

THE factory of the Robins Conveying Belt Co. at Passaic, N. J., is now running at full capacity, giving greater facilities for the manufacture of its patent belt conveyors than the company has before enjoyed. The draughting room and general offices of the company have been installed in the north tower of the Park Row building, Nos. 13-21 Park Row, New York City. The two towers of this building comprise the twenty-seventh, twenty-eighth, twenty-ninth and thirtieth stories, consequently these are the highest offices in the world, the thirtieth story being 375 feet from the sidewalk. The Robins Conveying Belt Co. cordially invite their friends to visit their new offices, from which a remarkable view of Greater New York is obtained.

Recently Declared Mining Dividends.

Buffalo Hump M. Co., Idaho, 1%.	April	2
Gold Deposit M. Co., Colorado, $10,000	March	15
Arizona Copper Co., Arizona, $1.87 per share	March	3
Anaconda C. M. Co., Montana, $2 per share	April	30
Lillie G. M. Co., Colorado, $11,-367.18	April	1
Independence T. & M. Co., Colorado, 1 cent per share, $12,500.	April	12
Cripple Creek Con. M. Co., Colorado, 8 cents per share	March	24
Amalgamated Copper Co., 2%	April	30

Latest Market Reports.

SAN FRANCISCO, March 22, 1900.

SILVER—Per oz., Troy: London, 27¾d (standard ounce, 925 fine); New York, bar silver, 60c (1000 fine); San Francisco, 60c; Mexican dollars, 49c. Dow, Jones & Co. say: "The sale on the Exchange of 20,000 ounces of silver at 61, buyer 60, is thought to indicate an impending movement by the United Metal Selling Co. to advance silver to a much higher plane. This company now practically controls the entire export of silver from the United States, through its relations with the American Smelting & Refining Co., and has great influence in the London silver market."

COPPER.—New York: Lake, 1 to 3 casks, 16.50 cash; carload lots, 16; Electrolytic, 1 to 3 casks, 16.25; carload lots, 16.00; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17⅛@18. Mill copper plates, 21½c; bars, 23½@25c. The British Admiralty last week bought 2,000,000 pounds copper for immediate delivery.

LEAD.—New York, $4.67½; St. Louis, $4.68; San Francisco, $4.85; pipe 7½, sheet 8¾, bar 6½c. London, Soft Spanish Lead, £16 10s=4.70c per lb.

SPELTER. — New York, $4.55; St. Louis, $4.55; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 50@55c ℔ lb.

SOLDER. — Half-and-half, 100-lb. lots, 22½c; San Francisco, Plumbers', 100-lb. lots, 19c.

IRON. — Pittsburg, American soft—pig—large lots—$25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c.

STEEL.—San Francisco, bar, 12c to 20c per lb.

QUICKSILVER. — New York, $51.25; London, £9 14s; San Francisco, local, $51.50 ℔ flask of 76½ lbs.; export, $47.50.

PLATINUM.— San Francisco, crude, $16 ℔ oz.; manufactured, $19.50@22.00

FERRO-MANGANESE. — San Francisco, ℔ ton, $30.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

TIN.—New York, pig, $32; San Francisco, ton lots, 36c; 1000 lbs., 36½c; 500 lbs., 37c; less, 38c; bar tin, ℔ lb., 41½c.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ℔ set; 14 oz., 40s., 11c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

OILS.—Linseed, strictly pure, boiled, bbl., 68c; cs., 73c; raw, bbl., 66c; cs., 71c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 47½c; cs., 52½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 40c to 50c.

NICKEL.—New York, 40@45c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.80

50-lb lots; San Francisco, $2.50 to $3 ℔ lots.

TUNGSTEN.—New York, ℔ lb., 75c; San Francisco, 90c.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs, $10.05; Colorado Anthracite, $14.50.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 33@35c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, 1¼c ℔ lb. 66° B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

San Francisco Stock Board Sales.

SAN FRANCISCO, March 22, 1900.

9:30 A. M. SESSION.

100	Andes	200	Union
100	Belcher	500	Mexican
400	Caledonia	300	Ophir
300	St. Louis		

2:30 P. M. SESSION.

900	G. & C	500	Overman
300		400	Union Con
300	B. & B	200	Alta
200	Chollar	100	Caledonia
200	Alpha	200	Andes
200	Belcher		

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: **EDWARD N. BREITUNG,**
MARQUETTE, MICH.

Quicksilver

——FOR SALE BY——

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - 426 CALIFORNIA STREET,
SAN FRANCISCO.

SITUATIONS WANTED.

By a Practical Miner who is thorough and up to date in working a mine. Can handle men to advantage. Understands milling, concentrating and the erection of all kinds of mining and milling machinery. With some years of experience. Will accept a position to manage a mine or mill. First-class testimonials furnished as to abilities, integrity, etc. Address QUARTZ, care Mining and Scientific Press.

Wanted—A Position as Superintendent
in a hydraulic mine by a miner who has had twenty years' experience. Best of references as to ability, honesty and sobriety. Address S. O. G., care of Mining and Scientific Press.

Mining and Metallurgical ENGINEER

DESIRES POSITION.

Had long experiences in gold and silver mines and reduction plants. Had charge of stamp mills and cyanide plants. Can furnish best of references. Address CYANIDE, care this office.

WANTED.

A competent and experienced Hydraulic Engineer capable of taking full charge of an extensive piece of work. Answer: Wrenn, California Hotel, S. F.

Wanted—Gasoline Engineer,

One who is a machinist preferred. Applicants state references and salary expected. Address M. M., care of this journal.

WANTED TO BUY,
Two or Three Saddle Tank Locomotives, 36-Inch Gauge. Porter or Baldwin Make Preferred. Must be in good condition. TORBERT & PECKHAM, Monadnock Block, Chicago.

WANTED.—A Second-Hand White Howell Roaster, also a Revolving Drier.
Must be in good repair. Address ARTHUR HENDEY, Agent, Copper Chief Mining Company, Jerome, Arizona.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

CAPE NOME

PORTABLE MINERS' HOUSES.

New System. Warm and Substantial.

Very compact when knocked down for shipment.
BURNHAM-STANDEFORD CO., Washington & 1st Sts., Oakland, or Builders' Exchange, San Francisco.

Quicksilver Mine.

FOR SALE, interest in developed quicksilver mine. Furnace completed. Cheapest property on the coast to work. Capital required for additional machinery. Address "Investment," care of Mining and Scientific Press. PRINCIPALS ONLY.

FRED C. MILES,
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COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

FOR SALE.

10 H. P. Gasoline Hoist for Sale.

Complete outfit in good condition. Price low. Address PAUL J. PITNER, Placerville, Cal.

FOR SALE.—DIVIDEND-PAYING, HYDRAULIC placer. Extensive deposits. Old channel gravel, water, pressure, grade, dump, and gold. Rigid investigation invited. Thoroughly legitimate. Banking references. Owner. IDAHO, care of Mining and Scientific Press.

Mines for Sale.

A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.

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Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico

A BARGAIN.

3500 feet of 16-inch, 5 B. W. G National Tube Works seamless pipe. Kimberly joints. Immediate delivery.

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STEEL RAILS FOR SALE.

400 Tons 40-lb Relaying T Rails with Plates. One 30-Ton Saddle Tank Standard Gauge Locomotive, f. o. b San Diego, Redondo, or San Pedro, Cal. Correspondence solicited.

C. J. TALLON,
308 Market Street. San Francisco, Cal.



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Relaying Rails

For Mines and Street Railways.

LEE CHAMBERLAIN & CO.,
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BUSINESS COLLEGE.

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MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.
ELECTRICAL DEPARTMENT: Theory and Practice; Construction.
BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.
Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from George H. Hedrick, in the Hedrick Gravel Mine, near San Andreas, Calaveras Co., to deposit tailings on a flat below the mine; from Wm. Weyman, in the Weyman Placer Mine, near Placerville, El Dorado Co., to deposit tailings in a reservoir below the mine; from Hugh H. Crain, in the Pigeon Creek Mine, near Plymouth, Amador Co., to deposit tailings in Indian Creek; from Henry Meyer, in the Greenhorn Mine, at Cherokee, Nevada Co., to deposit tailings in Shady Creek; and from the Emery Gold Mining Company, in the Emery Hydraulic Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in Adobe Gulch, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on April 2, 1900, at 1:30 P. M.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

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ASSAYERS AND WASTE PRODUCT SMELTERS,
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SCIENTIFIC PRESS PATENTS PATENT AGENCY
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544A MISSION STREET, bet First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

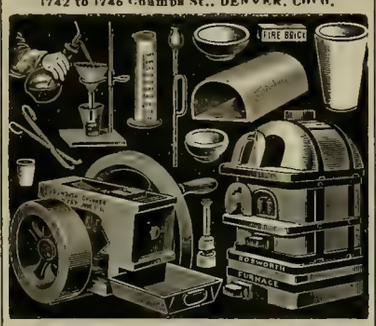
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COLUMBUS BUGGY CO.'S VEHICLES



Are too high in price to admit of as much profit as the cheaper grades usually handled by agricultural implement dealers. A cheap vehicle costs just as much freight from the East as a good one, thus you get but little value for your money after paying three profits and freight.
If Columbus Buggy Co.'s vehicles are not on sale in your vicinity please write to the

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Between 9th and 10th, San Francisco, Cal.
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Peroxide of Sodium
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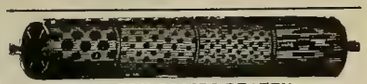
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Mining Screens
A SPECIALTY.

Diagonal Slot,
**Straight " **
**Burred " **
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332



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Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.
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A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F.

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WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

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Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

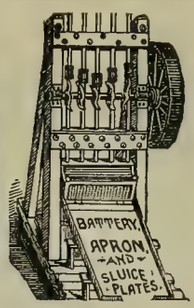
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Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as "STANDARD OF THE WORLD" is built on merit. Is the best too good for you?

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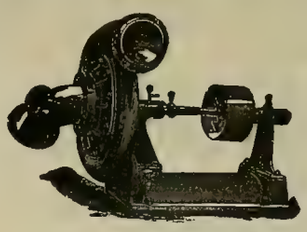


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For Saving Gold in Quartz and Placer Mining.

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COMPLETE PLANT IN OPERATION AT OUR WORKS.

Centrifugal Pump and Steam or Oil Engine Direct Connected.
Sand Pumps, Rock and Gravel Pumps, Mining Machinery, etc.

Jackson's Whirlpool Centrifugal Pumps. Capacities from 50 gallons to 50,000 gallons per minute.

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Steam Shovels Dredges and Traction Dredges

Suitable for all kinds of **Excavating Work,** making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a **dry land excavator** or **floating dredge.**

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——For use in——
Mining, Milling and Ore Dressing Machinery.
All sizes suitable for Battery Screens, Jigs, Trommels, etc.

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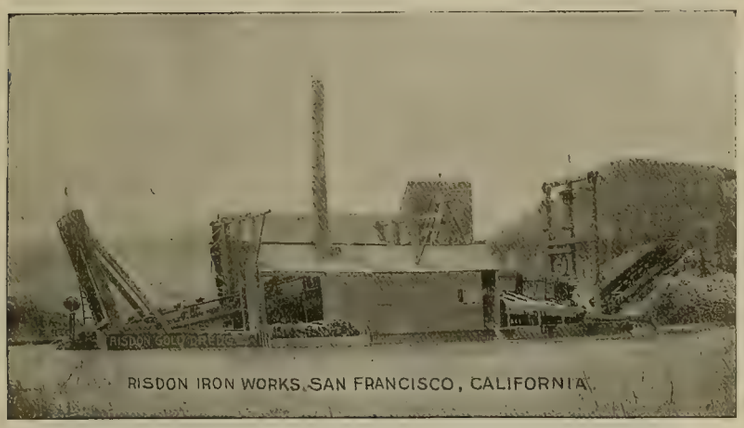
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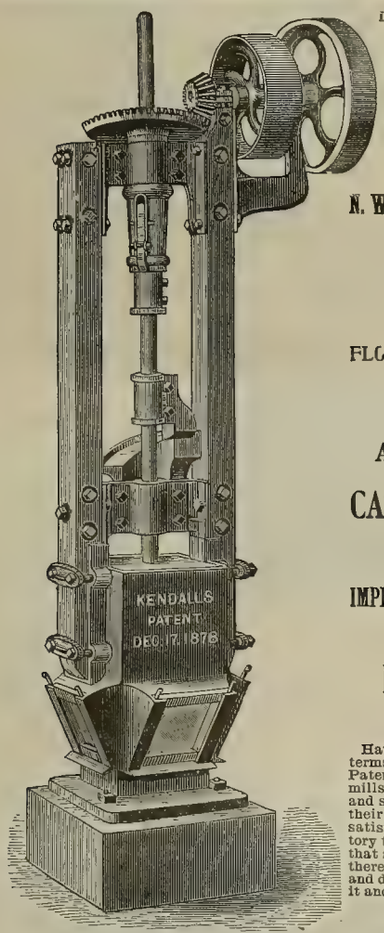
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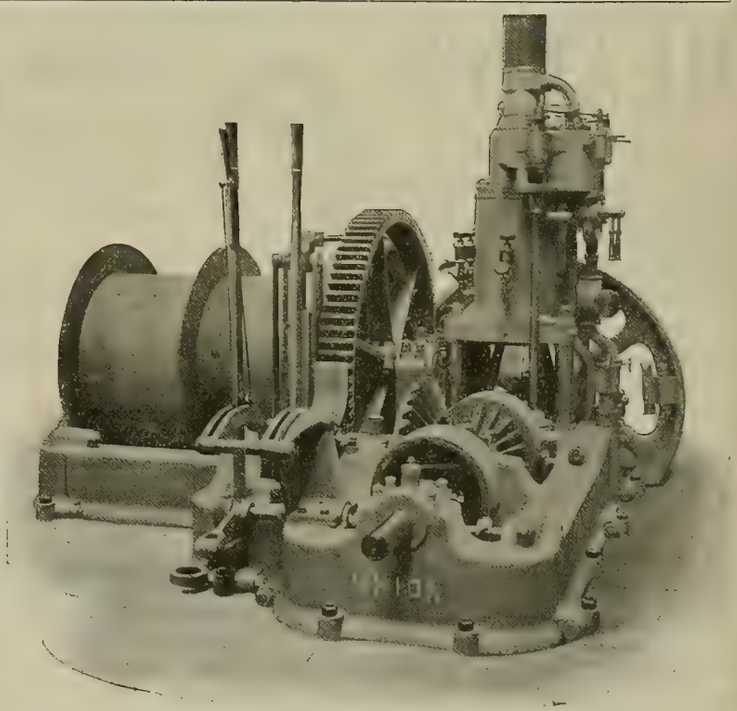
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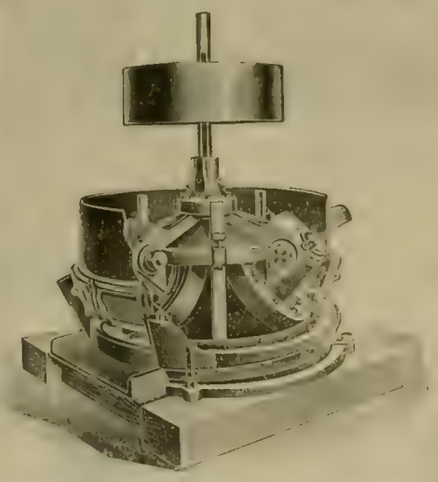
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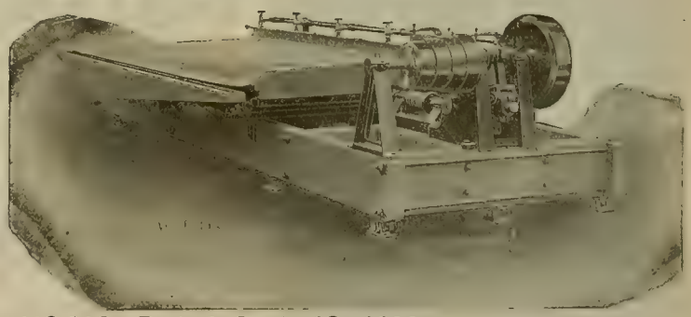
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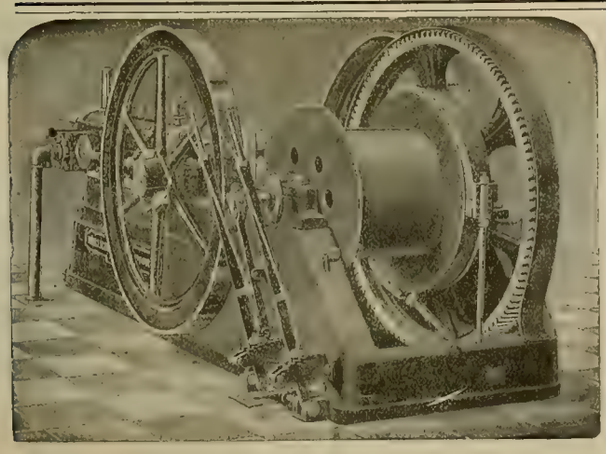
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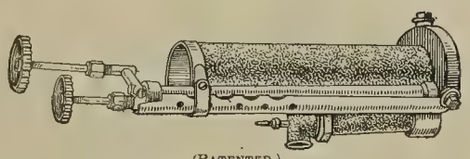
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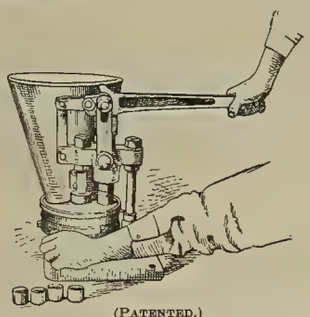
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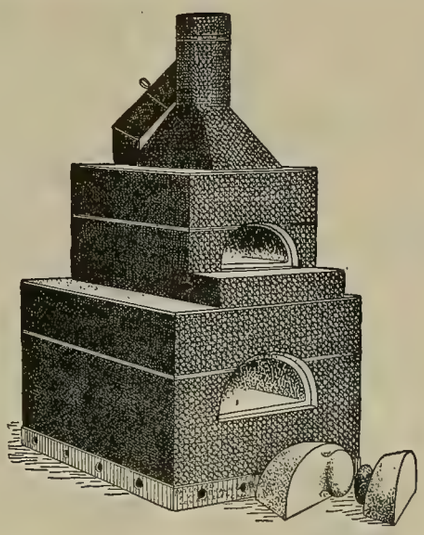
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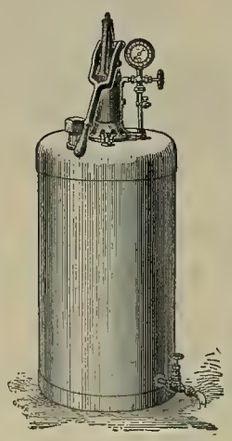
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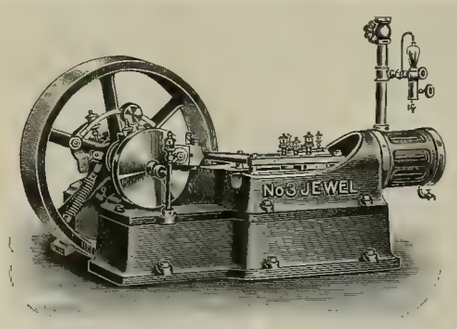
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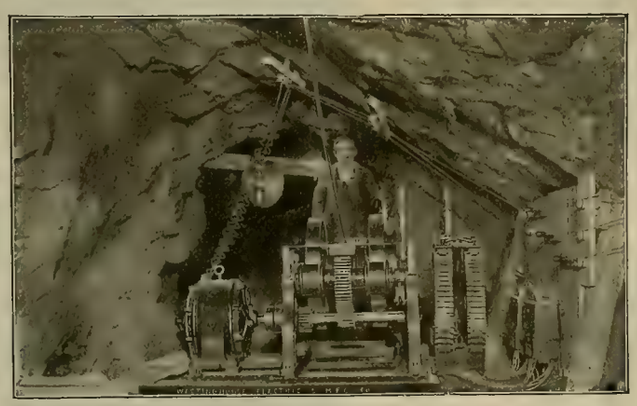
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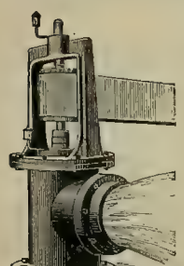
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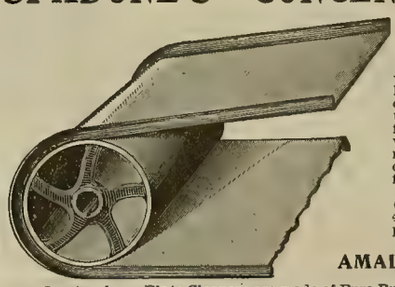
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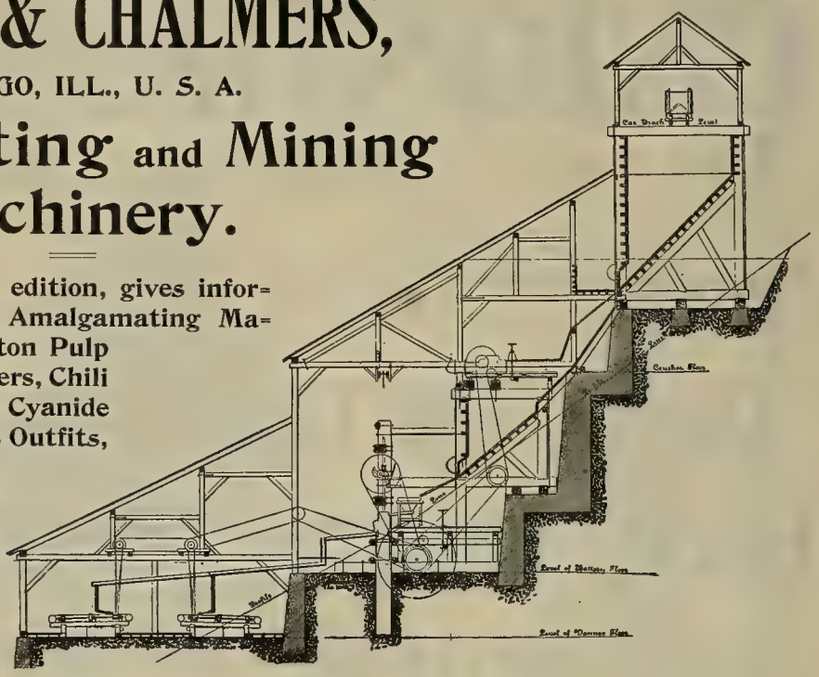
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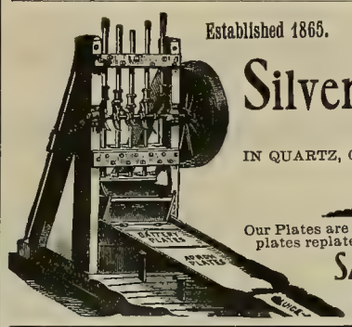
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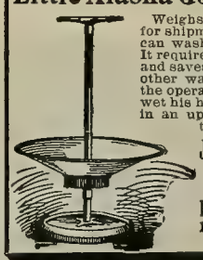
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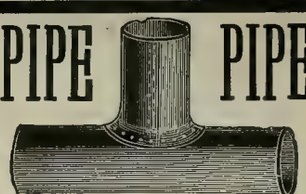


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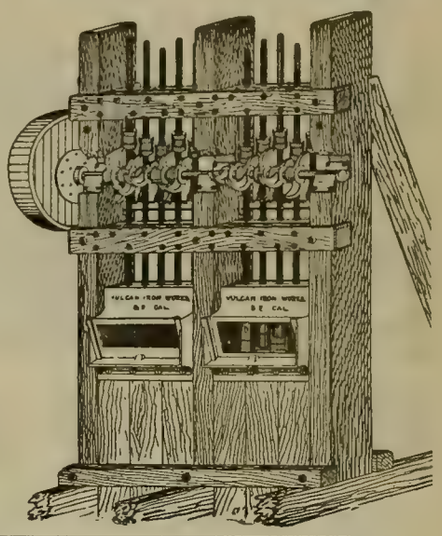
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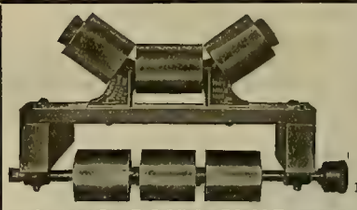


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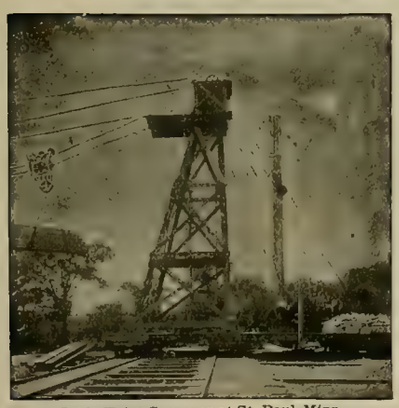


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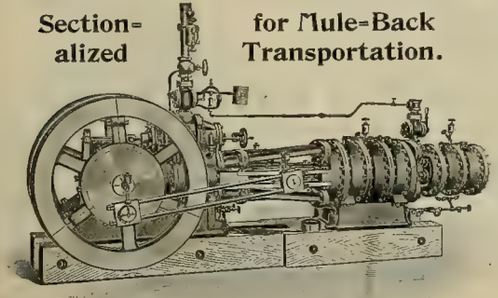
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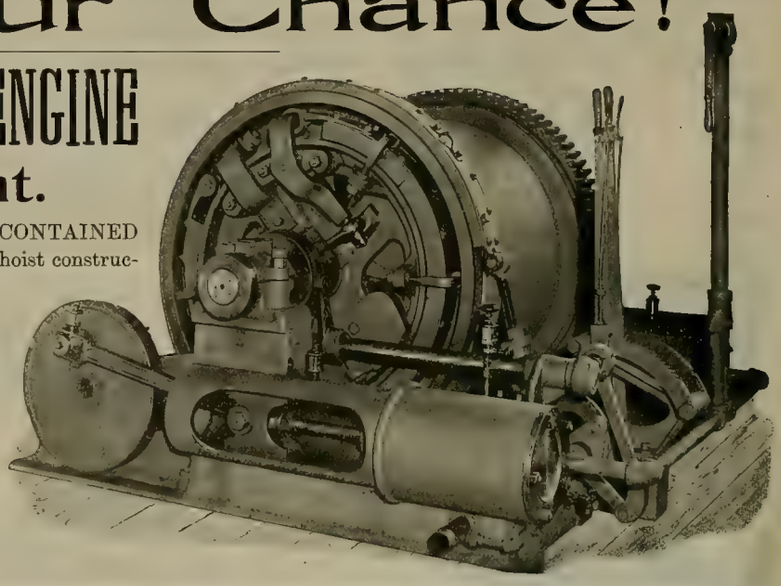
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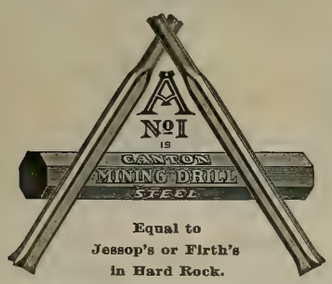
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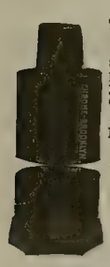
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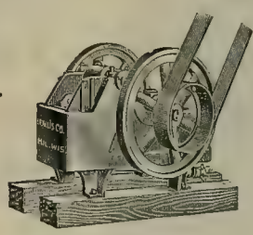
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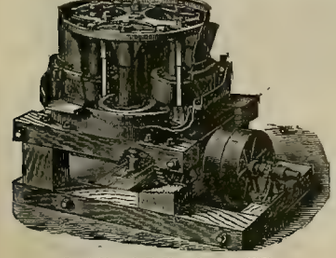


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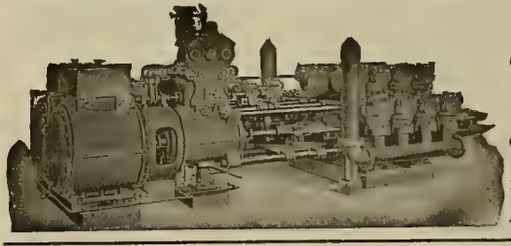
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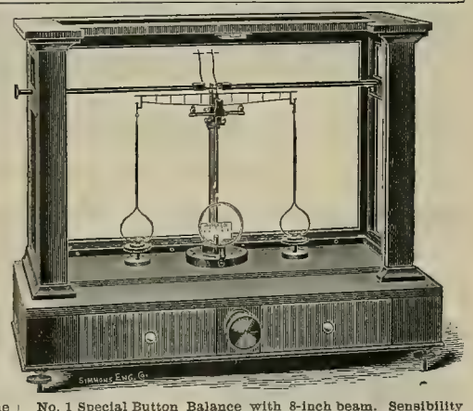
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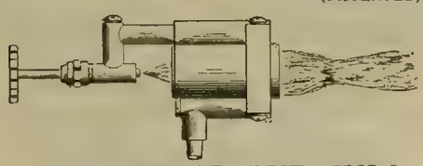
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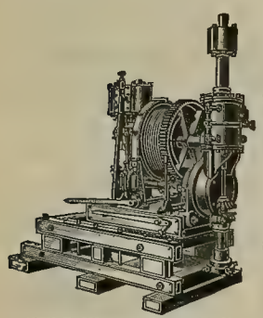
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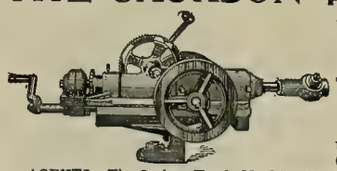
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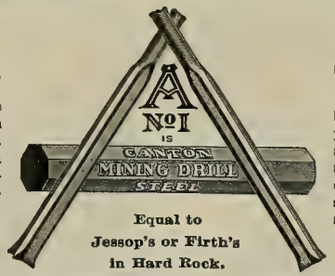
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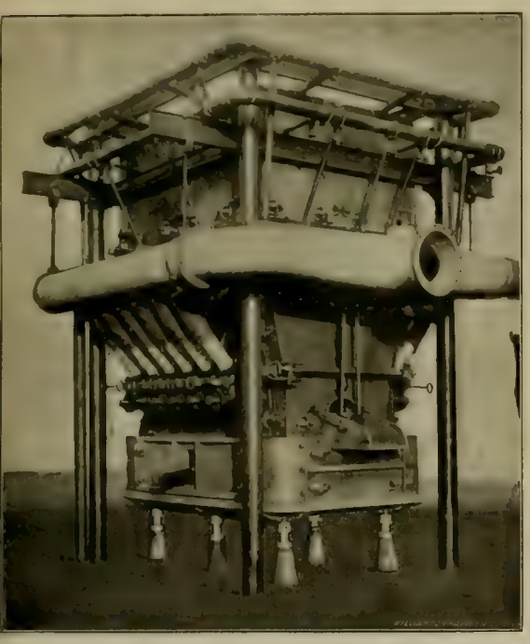
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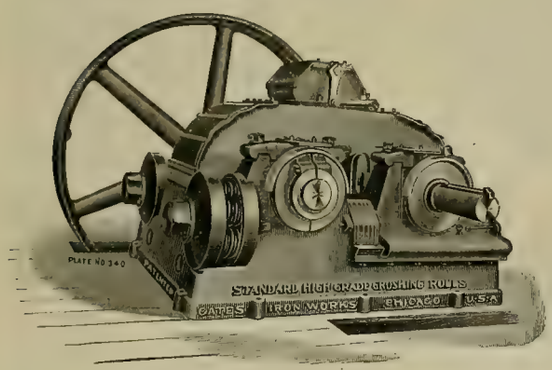
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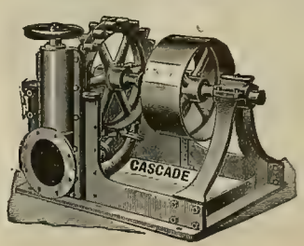
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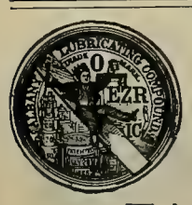


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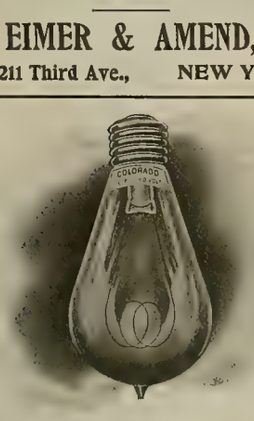
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Any stock upon which this assessment shall remain unpaid on the 28th day of April, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

Office—307 Montgomery street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1900, an assessment (No. 11) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of May, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 26th day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

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Any stock upon which this assessment shall remain unpaid on the 10th day of April, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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A. W. HAVENS, Secretary.

Office—Room No. 29, Nevada block, No. 309 Montgomery street, San Francisco, California.

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Notice is hereby given, that at a meeting of the Board of Directors, held on the 17th day of March, 1900, an assessment (No. 2) of six-tenths (6-10) of a cent per share was levied upon the capital stock of the corporation, payable immediately to the secretary, John F. Barnett, at Room 22, No. 222 Sansome St, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23rd day of April, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on MONDAY, the 14th day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN F. BARNETT, Secretary.

Office—Room 22, No. 222 Sansome St., San Francisco, California.

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Notice —There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of January, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

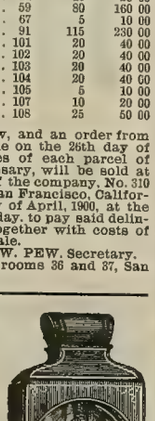
Name.	No. Cert.	No. Shares.	Amt.
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Clark C. Bradford	40	13	26 00
Annie M. Bradford	41	10	20 00
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Geo. H. Bradford	91	115	230 00
Geo. H. Folsom	101	20	40 00
Geo. H. Folsom	102	20	40 00
Geo. H. Folsom	103	20	40 00
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Luther J. Holton, Trustee	105	5	10 00
Luther J. Holton, Trustee	107	10	20 00
F. E. Densmore	108	25	50 00

And in accordance with law, and an order from the Board of Directors, made on the 26th day of January, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, No. 310 Pine street, rooms 36 and 37, San Francisco, California, on MONDAY, the 2nd day of April, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

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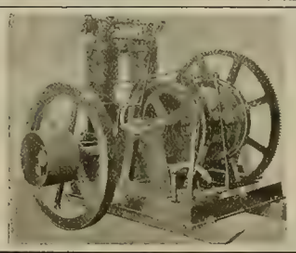
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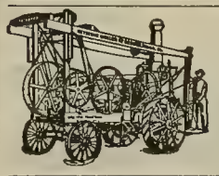
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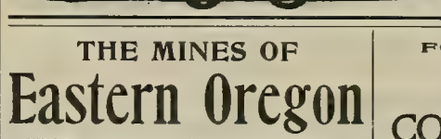
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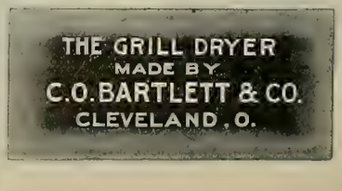
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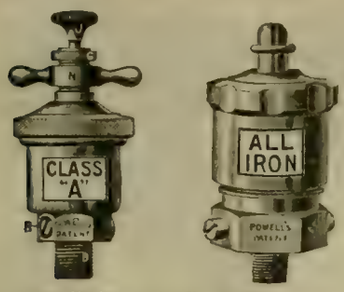
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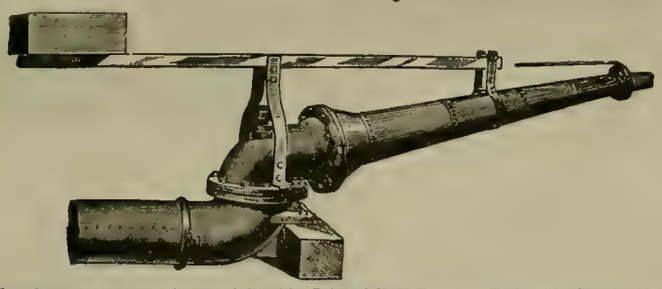
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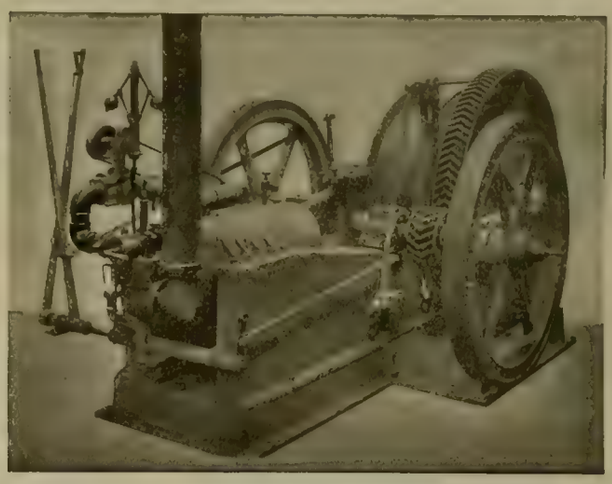
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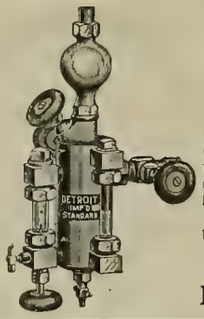
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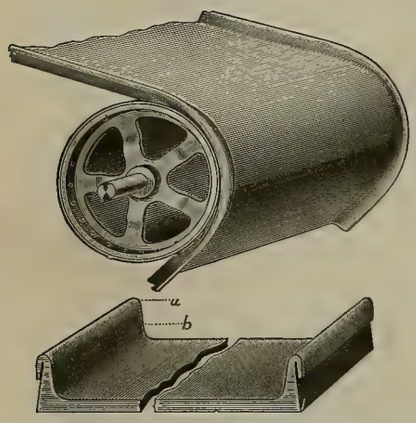
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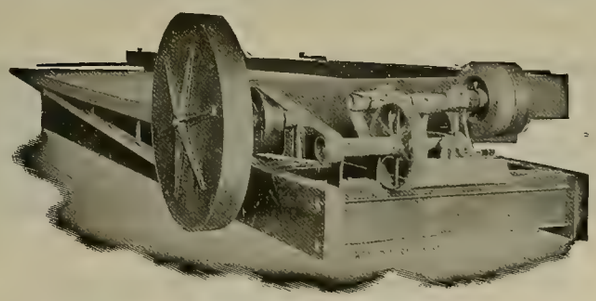
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Scenes in the Operation of the Cariboo Hydraulic Mining Company's Property, Bullion, Caribou District, B. C. (See page 346).

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In connection with the present oil development in California, the status of the petroleum miner, what "scrip" is, oil titles, etc., become matters of moment to many. In next Saturday's issue—April 7th—this entire subject will receive authoritative notice. There is immediate need for intelligent information upon these matters, and every one interested in any way in oil will want such definite and reliable statement.

The U. S. Attorney General this week rendered an opinion in which he holds, in effect, that the time limit in the proviso in paragraph 181 of the tariff Act of July 24, 1897, which says that the refined metal produced from imported lead ores must be reexported, or the regular duties paid thereon, within six months of the date of the receipt of the ore, must be reckoned on the date the ore was received at the smelter, and not from the date the ore was received at the port of entry.

It is the generally accepted idea that increased demand for anything implies increased prices, and that an increased supply causes lower prices. But while this may seem locally, or momentarily, the case, yet in a broader way increased demand tends to decrease prices by creating enlarged markets, by occasioning more economical production and by directing attention to opportunity for profit with result of keen competition. The usual resultant is in open market that price of anything becomes the cost of production plus ordinary business profit. Where this is lacking a business dwindles or ceases. Wherever there is big profit competition is soon set up, for, with money at 3%, capital is soon attracted and it is this availability of capital that makes increased demand soon result in reduced prices.

The claims of an "ore vaporizing" company recently organized at Spokane, Wash., are of the absurd kind sometimes made by incorporators who, in ignorance or defiance of existing metallurgical requirements, publish fantastic theories as settled, indisputable facts. The concern "vaporizes" the ore at a heat of 3000° F., "recondenses" it, and "successfully treats refractory ore at a cost of $1 per ton." The oxygen and nitrogen in the air are separated "mechanically," the non-combustible nitrogen serves as a jacket to protect the furnace from the heat, etc., the usual "secret" process being in this case a mysterious steel cylinder, in which the "mechanical" separation of the oxygen and nitrogen takes place. To miners or metallurgists it is, of course, unnecessary to say that the scheme is impracticable. The projectors may be perfectly honest in their belief and intent, but sincerity of purpose unaccompanied by any commercial merit in a proposed plan is not wholly commendable from the investor's point of view.

The Hegira of 1900.

The Klondycitis of '97 is being repeated by those afflicted with the present form of Alaskamania, who are now rushing to Cape Nome. In the next sixty days it is probable that 50,000 men will leave Pacific coast ports, who will average $500 each for expenses, the rest to be charged up to experience. This $25,000,000 could be spent to better advantage developing a better mining country with better returns; but with the man determined to go to Cape Nome it were idle to dispute. He has the money to get there and is going, and that's all about it. Authentic facts have been published herein regarding the rich gold beaches of Cape Nome, illustrations from photos specially taken have been published in these columns, and accurate data given concerning that region, as is the province of a mining journal.

That wonderful gold finds have been made is undoubted fact, and great riches have already been won. The trouble or mistake is that the thousands rushing up there do not realize that the whole thing is already overdone; that everything procurable is already gobbled up; that there is now no chance in such a place for new comers or any one but men with capital or phenomenal skill; that luck plays little part, and that such a country (compared with which even the Klondike is a paradise) is fatal to any one not thoroughly acclimated.

The matter is referred to merely as a noticeable mining feature—the hegira of 1900—another manifestation of the great daring, the indomitable courage, the admirable spirit of undaunted energy that forever animates the American miner, pushing him on and on, farther to the frontier. One must admire the spirit, even though some manifestations of it are occasionally noticed with regret, as in this instance, where it is so clearly manifest that mistaken energy is hurrying many a deserving man to disappointment and death on that slender strip of shining sea coast as he follows the lure of Fortune's hope to the ends of the earth.

Unwise Mining Legislation.

Whether in Colorado, California or Canada, an attempt to make a pint cup hold a quart, or make one man as efficient as another by law, is the same blunder. The recent attempt in British Columbia to make an eight-hour law, creating a "legal day's work," has had the usual effect of such legislative meddling and muddling.

It is locally estimated that the stock valuation of the War Eagle mine in British Columbia was depreciated in a few days to the amount of $3,990,000, owing to the closing of the mine. The stock valuation of the Center Star suffered a shrinkage of $2,275,000 for the same reason. These mines were closed because of the labor troubles, occasioned solely and primarily by mischievous legislation: well-meant, good-intentioned, but none the less hurtful. Everything was going along all right; miners getting good wages, mine owners getting some profit on results, when the Provincial Legislature thought it would be a bright thing to make an eight-hour day the legal rule in British Columbia metal mines. The inevitable result followed, as detailed for some months past.

There is always need for judicious legal aid and helpful mining legislation, but in all cases a little sense is necessary on the part of the legislators. The miner himself has a good deal of common sense and readily understands whether a proposed measure will help or hurt the mining industry. Usually his condition is immediately affected by mining legislation and any attempt to change human nature by law is always unsuccessful. In general the fewer laws the better, so far as the miner is concerned.

Some time in the next century legislatures will learn that they might as well pass a law compelling everyone to work eight hours a day as to pass one making eight hours' work per day mandatory upon any particular class of workers. The one would be as likely of acquiescent observance as the other.

The most noticeable feature in present gold quartz mining operations in California is the continuous development of abandoned properties. Old mines, once profitable but long idle, are being profitably worked, the apparent idea being that it costs less to operate where former fortunes were taken out than to prospect new ground. Mining and scientific progress permits profit where formerly low-grade ores could only be worked at a loss, and the era of deep mining in California as compared to the old, vanishing day of surface richness has begun. Time was when nothing 250 feet below the surface was followed; now gold is being profitably mined in California from a depth of 2300 feet.

A Possible Contingency.

It was recently stated herein that in the event of defeat or the probable British siege of Pretoria, S. A., the Boers would essay destruction of Johannesburg and all the destroyable property pertaining to the Rand mines. A variety of editorial opinion has since been expressed as to the probability or unlikelihood of such action. A Houghton, Mich., report this week says:

Leading mine managers and engineers from the Transvaal who have visited the copper district since the beginning of the Boer war regard the destruction of mining plants in the Transvaal as highly probable. Mine managers are here to place orders for new equipment immediately after the destruction of the old machinery. One Johannesburg mine manager, now here, has full plans and specifications for a new plant which will cost about $1,000,000. Leading American machinery manufacturers have made conditional bids on probably $20,000,000 worth of new mining machinery for South African gold mines.

In war all things are possible, and the South African Republic Sampson may pull down the pillars of the Temple in an attempt to involve all in common ruin, so far as the immediate future is concerned. It is a tempting trump for Kruger to hold, and if, bereft of business reason, the Boers decide to wreck the machinery and blow up the mines, they are of that mold that brooks no restraint. He who has nothing to hope for has nothing to fear, and should the men who braved the British three times decide that in final defeat no mercy is to be shown, they may conclude to wreak as much havoc as possible before final surrender. If, on the contrary, the Boers hope for life and liberty under British domination, they will refrain from using their opportunity further than a menace to evoke better terms from their conquerors.

Explanation of Recent Land Office Ruling.

Comment was made in the issue of the 10th regarding an alleged U. S. Land Office ruling, that where a shaft costing $2500 was sunk on a group of five claims, that did not suffice, but that in such case $500 worth of work must be done on (not for) each claim. The case was reported from Utah. Register Blanchard of Salt Lake City says the report was misleading, and writes:

The ruling of the Commissioner of the General Land Office was in a case where the applicant sought to apply the work done on ground for which U. S. patent had been issued in 1875 as the $500 improvements on a lode claim of recent date and for which a separate application and entry had just been made. There was a time when the Land Office accepted such improvements upon patented ground, for later locations, as a sufficient compliance with the requirements that $500 worth of labor or improvements must be expended or made to enable the owner or owners to obtain U. S. patent, but this, AND THIS ONLY, is now affected by the new ruling. Where the work is done and the improvements made upon one claim of a group, the claims of the group consolidated, and the whole group embraced in one entry and application for patent, there is no change in the practise, and there is no doubt but what this work and improvements will hold the group and enable the applicants to obtain patent from the Government.

At Butte, Montana, another big mining suit is on this week, the litigation, as usual, being over the ever present question of apex and extralateral rights. This time it is the Colusa-Parrot M. & S. Co. vs. Anaconda Copper M. Co., and involves the ownership of the Anaconda vein. Plaintiffs charge defendant with entering the ground within the lines of the Parrot and Macawber lodes and extracting ore that is claimed to be part of the vein in Colusa-Parrot ground. Defendant admits having taken ore of the value of $5300, but asserts that it had a right to do so, claiming that it is working its own vein, which has its apex on the Anaconda lode. Plaintiffs assert that the Anaconda vein merges into their vein at the disputed point and that by reason of the Parrot being the older or prior location is entitled to claim the vein. Defendant denies this and says its vein does not join with the Parrot, but is distinct, separate and 150 feet north of the Parrot vein.

Concentrates.

CYANIDE'S proper place is rather in the leaching vats than in the battery mortar.

ALL professionals were once amateurs, and all good mines were once only prospects.

IT will take about 820 feet No. 23 wire, A. W. G., to give a resistance of seventeen ohms.

THE average value per ton of Australian ore treated is $14; $3 ore is treated at a profit in this country.

DIVIDENDS amounting to $37,275,750 have been paid by twenty-three mines in Utah to January 1, 1900.

ACCORDING to the mining laws of South Dakota, a working shaft 200 feet deep is required to operate a cage.

PYROMORPHITE is a phosphate of lead and is not unusual. It is found in the Bertha mine, Silver Cliff, Colo.

A SOLUTION containing a mixture of hydrocyanic acid and a carbonate or bicarbonate of alkali is a solvent for gold, if oxygen be present.

A SIPHON may aid in unwatering a shaft to a depth of 25 feet if conditions are favorable. With greater depth a pump or other appliance would be necessary.

ELECTRIC HEADLIGHTS are in use on some of the Southern Pacific Ry. Co.'s locomotives, and on some San Francisco street railways, with satisfactory result.

AT 50° F. sea level a cubic foot of air weighs 536 grains. At the Ft. Point battery, overlooking the San Francisco harbor, a cubic foot of air as there compressed weighs ten pounds.

THE watt output of the machine in question may be calculated by multiplying the voltage on open circuit by the amperage on closed circuit, and dividing the product by four.

THERE are many advantages claimed for wire screens and round-punched tin or sheet iron used in milling gold ores, the weight of practical evidence being apparently in favor of the latter.

TO PREPARE carbon paper for copying purposes, melt ten pounds lard, one part good wax, and mix with sufficient fine lampblack. Saturate unglazed paper with this; remove excess, and press.

IN nearly all copper blast furnaces from 40% to 60% of the sulphur in the charge is consumed in the blast, and the mattes are oxidized down to what may be termed a critical point, where they contain about 23% sulphur.

THIS PAPER is not responsible for the acts of any one who may make unauthorized claim to be its agent or representative. All its agents or representatives have credentials or authorization properly signed and dated.

SINCE January 1st the three different news companies handling the transient sales of this paper have each materially increased their weekly orders. Since Jan. 1st the names of 415 new subscribers in the one State of California have been received.

THE plural of dynamo may be spelled "dynamoes." It is one of the proudest prerogatives of an American citizen to spell any word as pleases his sovereign fancy, though making spelling entirely a matter of private judgment is not deemed wholly wise.

THE Columbia College School of Mines opened in '64, was the first school in the United States in which mining was taught as a science. There are several fine technical schools of mining now in independent operation or connected with a college or university.

IN Arizona in the present drought the gas engine will be able to demonstrate its utility in mining operations. Any kind of water will do, for it is only needed to cool the working cylinders; of this very little is required, and that little can be used till it evaporates.

LITTLE GOLD, but much silver, is produced in Bolivia, ores carrying 120 ounces or more of silver to the ton being shipped to Europe, lower grade ore crushed in local ball mills and subjected to a rude chlorination process, the net extraction being about 80% of the assay value.

IN common with other products, the cost of mining machinery has necessarily increased because of advanced prices for material, which in some cases is nearly double what it was two years ago, though recent advance in the price of the finished product is not more than 40% in any case.

THE California State Miners' Association has been in existence about eight years. It owes its existence to the faithful and unselfish efforts of earnest men and the liberality of its supporters. It has never had an "organ," nor has it ever authorized any one anywhere to represent it by any serial publication.

IT is difficult to get any record of old abandoned mines in California, and if there were such a law as suggested, requiring of every mine owner that surveys of all underground workings should be made and filed with a designated official, it would inure to the benefit of those engaged in opening up such old properties.

ALL modern inventions and discoveries are based upon new applications in the utilization of energy. Few new things are found out, and few new material combinations made. The closing century in science is most remarkable for discoveries, inventions, applications and utilizations of the various forms of what we term "energy."

MAGNESIUM has an electrical conductivity equal to 41.2% of that of pure copper. Alloyed with aluminum up to 10% of magnesium it increases the strength and elastic modulus of that metal, but greater additions yield a weak and brittle alloy. So far as known, all attempts to form an alloy of copper and magnesium have failed.

IN any gravel mining proposition the first thing to be determined is the pay value and nature of the gravel. Thorough prospecting, definite preliminary work, is first needed, then the opinion and advice of an experienced miner, then the investment in requisite ditch, pipes, flumes and machinery and intelligent supervision by a competent man.

TO MINERS the fact that a prospect, a claim or a location is an extension of or "adjacent" or "contiguous" to a producing property is not always a recommendation. Indeed, in some cases such "extensions" are notably deficient, as though Nature had exhausted her resources in that particular vicinage in filling the vein at the point where it proved so rich.

RUBBER can be fastened to smooth iron surfaces. Soften powdered shellac in ten times its weight of strong water of ammonia; a transparent mass results which becomes fluid after being kept a month. This, when applied, will soften rubber, which can thus be made to adhere closely to a smooth iron surface. The rubber hardens upon the evaporation of the ammonia.

THE typical Mexican smelting furnace, called "horno castellano," is a shaft in an adobe wall lined with stone, which will stand a high degree of heat. It is approximately square. It has a single tuyere, and the furnace is about 5.5 feet in height from the mouth to the tap hole. The bottom of the furnace has a slant forward. A shallow basin is scooped out in the earth in front of the tap hole, into which the molten metal is run.

TO SAY that a promoter is one "who sells nothing for something to a man who thinks he is getting something for nothing," while a smart saying, lacks accuracy or fairness. Quite often the promoter has a good thing for sale, and as frequently the buyer doesn't think he is "getting something for nothing," but does think, and rightly, too, that he is paying good money for something that, properly handled, may yield him a profit.

IN a steam engine the tangential pressure on the crank pin is equal to twice the total pressure on the piston, divided by 3.1416, because while the crank pin moves through 3.1416 diameters, the piston only moves through 2; hence, if the pressure on the piston is equal to 20,000 pounds, the tangential or mean pressure on the crank pin is equal to $\frac{20{,}000 \times 2}{3.1416} = 12{,}732$ pounds.

"THEORY" is of bad repute among many practical miners because of the gibberish and unintelligible language sometimes used by men who know nothing of the real work of mining and who pass for "theorists" among the men who do know and who do the work. The real "theorist" is the practical miner himself, who has intelligent theories born of comparison and experience, and who often makes of his theories valuable resultants.

THERE is considerable difference between a "miner" and a "prospector." A prospector is a good deal of a detective in practical mineralogy, watching every bit of float, deciding where it came from, noting country rock, formation, etc. A miner gives a good account of himself in timbering or getting out ore safely and cheaply, but notes little till he gets underground. Sometimes a good prospector is a good miner, and vice versa, but not as a rule.

IN California stamp mill practise stamps have been used weighing as much as 1400 pounds. Ordinarily the stamps weigh from 750 to 1000 pounds, have a speed of from eighty to ninety-six drops per minute, height of drop from 5 to 8 inches. In some parts of Colorado the stamps average 550 pounds in weight, have a drop of from 14 to 18 inches, and average about thirty drops per minute. These stamps are deemed in such action suitable to the ores they crush, the ores being more heavily sulphureted than those of California.

"DEVELOPMENT WORK" does not always develop, if it be shallow shaft sinking, running a lot of short tunnels, and, in general, "gophering." It often costs more to sink several shallow holes and run little drifts than one good shaft would, sunk deep enough to develop an ore body. While, of course, many a good prospect has been ruined by developing it, yet, if development be desired, the most usual better way is to concentrate the expenditure in one good shaft or tunnel rather than scatter. A rifle does better execution than a shotgun.

THE place to put your advertisement is in the paper read by those who want to buy your goods or your services. If you want to enlist the attention of sewing girls, tailors, butchers, farmers, sailors, etc., the dailies are doubtless good mediums. To get the attention of miners, results can be more cheaply secured by an advertisement in the paper that real miners read. The question for any advertiser is "Will the proposed advertisement bring me desired results?" Whatever will sell the thing advertised is good advertising.

A VOLUMETRIC method for lead analysis is as follows: Dissolve the substance to be analyzed in nitric acid, using a little hydrochloric acid, if necessary. When the decomposition is complete, add sulphuric acid and evaporate till white fumes of sulphuric anhydride are given off; dilute with water and cool; add to the liquid its own volume of common alcohol, and allow it to stand a short time. Filter and wash with hot water. Then wash the residue into about 50 c. c. of a cold saturated solution of ammonium carbonate with some of the carbonate solution. Stir frequently and vigorously for about fifteen minutes. Filter and wash both residue and filter very thoroughly with hot water. Dissolve the lead carbonate in hot dilute acetic acid. Cool and titrate with a solution of ferrocyanide of potassium.

A MINING CLAIM is a certain portion of a vein or lode and of the adjoining surface and subjacent material to which one or more have acquired possession by reason of compliance with federal, State and district rules, and carries with it the exclusive right and use of all the surface within the lines of location. The term mining ground is a much wider one, and may include a mine, or the interest of a mere occupant thereof, or, in a placer claim, the ditches, etc., in use therewith, or, in a quartz claim, all the veins or lodes having apex within its surface lines.

BY machine design is generally understood those calculations and drawings which are required for the production of efficient, economical and attractive looking tools and machines. This art demands such a combination of knowledge and skill as will insure a proper adjustment of strength to the work to be done, and such a distribution of the material employed and of the form into which it is put, that on the one hand there shall be no superfluous weight and consequent waste, and on the other no deficiency of material where material is needed. The machine designer begins where the inventor leaves off.

IN underground engines there is more wear and tear in the moving parts and cylinders, particularly when horizontal, than in surface—engines with longer strokes and a slower speed. Underground engines and pumps, being much smaller than surface engines and the pumps connected with them, must run at a much higher speed to get through the same amount of work, and the stroke being shorter a greater number of strokes is necessary. This leads to the valves of both the engine and the pump being operated a greater number of times, and causes considerably more wear and tear. This is considered one reason why long-stroke is preferred to short-stroke engines. Some of the movements of the valves of some pumps are so delicate that a slight obstruction will prevent their moving at all.

IRON and steel with a perfectly bright surface do not rust in absolutely pure water or air; carbonic acid or some similar agent must be present. Moisture, carbonic acid and oxygen being present, oxidation is not produced so long as vapor of water is not condensed upon the surface of the metal. In rusting, carbonate of iron is formed, which is dissolved in the water charged with carbonic acid and transformed into bicarbonate. In the presence of air, this is decomposed and gives magnetic oxide, then a hydrated oxide of iron. Polished iron and steel resist oxidation for a long time, but, once started, the rust forms rapidly and soon spreads over the entire surface. This is because the oxide of iron formed is electro-positive relatively to the iron, and is very hygroscopic, facilitating the absorption of moisture from the air. Steel and cast iron rust more easily than the purer metal; the more pure iron is, the more it is subject to oxidation. Phosphorus acts as a preserving agent. The alloys with nickel, cobalt and chromium are less readily rusted than common iron, while that with manganese is more so.

THE readers of the prospectuses of mining companies, of which there are at present no lack, are familiar with the phrase that "samples taken from the mine have been assayed by Messrs. So-and-So, and have yielded" so many ounces to the ton, as the case may be. While the name of the assayer is a guarantee that the samples submitted to him contained no more and no less than the amount certified, it is, however, in no sense a guarantee that the samples so tested represent the actual average value of the lode. This latter depends for its accuracy not only upon the sampler, the conditions under which the samples were taken, but also upon the quantity of the sample, and whether it was taken from a heap of ore already mined and accessible outside the mine, or from the lode itself as standing and exposed in the workings. The sampling of a heap of ore is of itself a difficult process, but with care and the exercise of patient skill, judgment, and supervision on behalf of the sampler, and the absence of interested parties, an approximately correct idea of its average mineral contents may be had.

STEAM ENGINES consume from twelve to fifty pounds of feed water and from one and one-quarter to seven pounds of coal per hour per indicated horse power. Condensing engines require from twenty to thirty times the amount of feed water for condensing purposes—approximately for most engines one to one and one-half gallons condensing water per minute per indicated horse power. Surface condensers for compound steam engines require about 2 square feet of cooling surface per horse power; ordinary engines will require more surface according to their economy in the use of steam. It is absolutely necessary that the air pump should be set lower than the condenser for satisfactory results. The effect of a good air pump and condenser should be to get 25 inches of vacuum and to make available about ten pounds more mean effective pressure with the same terminal pressure, or to give the same mean effective pressure with a correspondingly less terminal pressure. Approximately, a good condenser will save one-fourth of the fuel consumed, or, in other words, increase the power of the engine one-fourth, the fuel consumption remaining the same.

Copper Mining at Placeritas de Nacosari, Sonora, Mexico.

Written for the MINING AND SCIENTIFIC PRESS by H. B. LAYTON.

The colossal copper mining and milling enterprise of Phelps, Dodge & Co. of New York at and near Placeritas de Nacosari, Sonora, Mexico, ninety-eight miles south of Bisbee, Ariz., is nearly ready for operation. At a preliminary expense of approximately $3,000,000 gold, the owners of Bisbee, Globe and Morenci have opened up a new mineral country that will yield products of enormous value.

The work accomplished by the Moctezuma Copper Co., the corporate title of the Sonora enterprise, would, on paper, appear impossible; but it is practically complete; it is a reality, as the accompanying illustrations bear witness. Within a few weeks after this article is given to the public, the two five-ton vessels in the converting mill will be pouring copper 98% fine.

At the outset the natural question is: "What is the character and extent of the ore bodies that are deemed of sufficient value to justify a preliminary expense of more than $3,000,000 gold before a pound of product has yielded a cent of return?"

The answer in brief is: "A mountain of medium and low-grade sulphide ore." But a more specific explanation will interest the technical world, whose eyes are watching the progress of this giant undertaking and its general bearing upon the industry of mining, concentrating, smelting and converting.

The beginning of the history of the Moctezuma Copper Co. was capital and the nerve to spend it. The Guggenheims of New York might have arrived at the same results when they owned and operated the property. They had a 100-ton plant at old Nacosari that was fast becoming obsolete. The faithful but insufficient burro was the carrier between the five miles that separated mine and mill; fuel was far away and, therefore, costly. When they realized that only modern facilities could turn that mountain of ore into gold that would outweight the cost of getting it, they balked. Then they made overtures to the Phelps–Dodge people. Prof. James Douglas, who represents them as president of the companies that control Bisbee, Globe and Morenci, and Prof. A. H. Ricketts, whose success in mineralogy and metallurgy has brought him fame, examined the Pilares mine, a patented property with a surface area of 150 pertenencias. Their report was favorable, with the qualification that only by an enormous investment could the proposition be made to pay. This was easy to people whose joint income is not much—if any—below $10,000,000 per annum. Therefore, the Moctezuma Copper Co. was organized; the deal with the Guggenheims was closed on the lines, it is understood, of $1,000,000 for the property. A ranch of 12,000 acres, on which was perpetual water, a fine mill and townsite, was bought for $30,000; $1,000,000 was appropriated for the reduction plant, mine development, six miles of railroad between mine and mill and a town. Another million was appropriated for a 96-mile extension of the Arizona & Southeastern R. R. (a Phelps–Dodge enterprise, extending from Benson, on the Southern Pacific, fifty-five miles to Bisbee, with a three-mile spur near the latter point to Naco) from Naco to Placeritas de Nacosari, the new town where the mill is located. This amount will not complete and equip the road, but it is a good starter. Two years ago work was commenced. At that time the only structure on the townsite was a little 'dobe, that still stands as a landmark in front of the big company store and affords shade and shelter for a litter of motherless pigs that receive the benign protection of A. H. Danforth, the present resident superintendent.

The fact that skill and dollars were given to the work without stint was sufficient to soften but not to overcome the enormous difficulties that stood in the way of the successful accomplishment of the project.



Sixth Level Portal, Incline and Terminus of Railroad.

Nature had provided ore, rock for foundations, clay for brick and lime and sand for mortar, but nothing else. It was necessary to assemble tools, steel, machinery and all appliances from the mills, some of them thousands of miles away, and the last 100 miles a wagon haul over prairie and through canyon and gulch, over which stretch it was necessary to carry feed for man and beast. Freighting this 100 miles cost from $20 to $24 gold per ton. The freighting account alone aggregated upward of $100,000. One might ask: "Why was not the railroad built first and this money saved to construction account?" Time will probably answer and show that what was apparently a prodigality was really an economy and good business policy. Thus was the beginning. It is no wonder the native marveled more and more as the work progressed and developed. Did not Americans also marvel at the very audacity of the undertaking? For the first time the Mexicans saw long rows of dwellings made of burned brick; they failed to comprehend the philosophy of the power of the pulley, why one man could raise with it a weight of many tons. Finally came the locomotive in sections in wagons. When it was set up and in motion their astonishment was complete. They no longer doubted that whatever the Americanos wanted to do they would do, and that muy pronto. So the work progressed. Artisans whose skill had been tested in the service of the owners elsewhere were brought to the various departments, and it is probable that a more competent body of men were never assembled. The completeness and thoroughness of their work shows for itself.

A description of the various departments includes the mine, mine railroad, power plant, concentrate mill, furnaces, converting mill, and the respective accessories of each.

John Evans is superintendent of the mine, Daniel Huff surveyor and accountant. The Pilares mine was so named because of the presence of pillar-like rocks that project above the mountain and may be seen from adjacent hills many miles away. Its first level elevation is 5250 feet above sea level and 1250 feet above the mill. Topographically, the mountain is exceedingly steep on three sides, and on the east, at a point 150 feet below its apex, a ridge forms a connection with Joriquipa mountain.

Geologically, the first object of interest upon examination of the surface is that Pilares and the mountain immediately west are covered with breccia, with, perhaps, trachyte as the binder. This seems to be a capping on the hard bird's-eye porphyry that continues to as yet an undetermined depth. The ore deposit lies between these formations. The eruptive belt continues from here in a southeasterly direction and can be traced a distance of three miles by iron-stained cappings to the Joriquipa, where the Bell Union mine, owned by the same company, is located. Parallel to this belt and three miles to the west granite comes to the surface in Nacosari mountain and extends north through the Barragon and Porique mountains. It is apparent to geologists that a trachyte belt broke through the bird's-eye porphyry which formed the breccia-capped Pilares mountain. The ore body lies wholly within this trachyte belt.

The surface ore contains considerable black oxide of copper, but a sharp change occurs at a depth of 55 feet below the capping. Generally the ore is chalcopyrite, imbedded in siliceous rock. The constituents of the average grade as analyzed by Mr. Huff were found to be:

Silica	45.5
Alumina	24.82
Iron	8.5
Copper	8.0
Sulphur	12.25
Lime	.63
Magnesia	.30
	100.00



Flashlight Showing Stoping Begun in 1st Level.

Supt. Evans on extreme left; face of ore body at shoulder of man on right.



Trestle on Mine Railroad, 400 Ft. Long, 89 Ft. High.

Lower grade ore is merely a change of quantity of metal occurring in the gangue. The chemical constituents are not changed except in quantity, according to the ore. Thus it is a typical concentrating rock on account of the cleanliness and regularity of the mineral. In the three miles of development work so far completed estimates were made daily from samples. Results of assays are indicated on maps showing the positions of the ore bodies in the workings throughout the mine.

Little note has been taken of surface indications, although prospecting is being continued on the summit and ore is being taken out by contract. This ore can easily be sorted to 20%. It occurs in stringers 6 to 7 feet in width, outside of the regular ore body.

Development has progressed to the sixth level. Down to this point the ore body has been so well explored that it is known that nearly or quite 2,500,000 tons of available ore are in sight. Below that level the extent and character of the deposit are yet to be discovered. It has been demonstrated, however, that the copper value increases with depth. For example, Superintendent Evans says a good percentage of the rock in the second level is 10%, and that in the fourth level 800 feet of drift and two 75-foot crosscuts were all in 10% ore when the work was stopped by water.

The first level is a main tunnel 2000 feet long, extending through the mountain from southeast and curving to northwest. In the tunnel, 400 feet from the southeast portal, a radiating drift in the shape of a segment of an ellipse has been cut and returns to a junction with the tunnel 400 feet from



Flashlight Showing Two Compartments of Main Shaft on 3rd Level.

the northwest portal. The ore deposit in the first level or tunnel is 60 feet wide. No. 2 level is also a tunnel, which is intersected by a drift near the main shaft, and with crosscuts, all in ore. The third level is in 1000 feet, with six crosscuts, the longest 105 feet, all in ore. The fourth level has a drift 800 feet and two crosscuts of 75 feet each, all in ore, but water interferes with further work. The fifth level is a drift of 500 feet, with one crosscut of 60 feet, all in 10% ore. The entire body of this level is chalcopyrite mixed with a black sulphide.

Four hundred feet west of the first level tunnel is the three-compartment main shaft, each 4x4.5 feet, timbered every 5 feet from center to center with 8x8-inch and corner posts of same dimensions. Two steel safety cages are operated on the alternating system by a 25 H. P. gasoline engine, made by the Union Iron Works, with a capacity of raising one and one-half tons 165 feet per minute. The hoist is a double cylinder vertical type. The other cage is operated by a horizontal gasoline engine. Sinking the main shaft from the third level down to the sixth is in progress.



Northwest Side of Pilares Mountain, Showing Pillars, Looking West.

The sixth level is a 7x9-foot double-track tunnel, leading from Rosario canyon at grade of the railroad terminus at this point. It will tap the main shaft 5000 feet from the portal, and will require nearly another year to complete. Nearly 2900 feet have been made through the porphyry, and the ore body is but little farther in. The tunnel is under contract to Geo. Quackenbush for $13 per foot—powder, two machines, power, tools and light furnished. He pays labor $2 and drillers $4, Mexican, per day, and is making from 150 to 180 feet per month.

Until the tunnel meets the main shaft all ore from the second and third levels will be hoisted to the first level. The cars will be run by electricity through No. 1 tunnel to the opposite portal, and there the ore will be dumped into bins, whence it will be transferred to the railroad cars, which will be hauled 2000 feet to an inclined plane, upon which the cars will be transferred to the railroad grade below. The Porvenir or sixth level tunnel when completed will handle all the ore, and it will relieve the fourth and fifth levels of water. The ellipse-shaped auxiliary tunnel, No. 1 level, will be used by the returning empty cars. The functions of the inclined plane will be further described later.

Up to the present stoping has only been started in the first level, a section of which is illustrated. The system of stoping by filling, as inaugurated here, will be continued throughout the mine. In this level the ore is taken out and waste is filled in from the surface through winches in courses of 6 feet. The tunnels and drifts are timbered with 10x10-inch stuff. The sets are 6½ feet in the clear, 4⅝ feet from center. Ore chutes will be built along the mainways, with discharge vents at intervals of 50 feet, and an ample number of manways will be provided. Three winches have been carried from the surface down through all levels and now extend to the fifth. Through these waste will be conveniently run down by gravity and placed where desired. The timbers to be used, therefore, include tunnels and drifts, manways and ore chutes. Considering that timber costs approximately $140 to $150 (Mex.) per M. at the mine at the present time, the saving in employing the filling system will be a large item.

A sawmill has been installed on Porique mountain, thirty-five miles from the mine, but such of its product as can be secured is needed for other purposes.

For completeness of work, precision of curves, permanency of fills, strength of trestling and perfection of alignment, the little mine road, J. W. D. Moodie, superintendent, is standard in everything save gauge. In the five and one-half miles of its length this 3-foot road rises more than 600 feet. It crosses canyons, cuts through mountain spurs and tunnels a divide. As a further evidence of the engineering skill required to secure uniformity of grade in consonance with the altitude to be gained, it need only be shown that the longest tangent is 800 feet, and they are few at that; the maximum radius of curves is 40°. Three trestles, one 400 feet long and 89 feet high, and a 400-foot curved tunnel were required. All curves are elevated to a speed of fifteen miles per hour, and from the mine down they are compensated to require for a loaded train the same power as for an empty train ascending. The slopes at all fills are faced with stone following the slope—in other words, practically walled. All cuts are through solid rock. The 40-lb. rails are all laid on tie plates. Mexican labor was employed and the task of getting intelligent work from them may be imagined. The cost averaged about $63,000 (Mex.) per mile.



Surface Workings Pilares Mine, Southeast Side.



Engine Leaving Tunnel on Mine Railroad Between Mill and Pilares Mine.

At the mine terminus at Porvenir, in Rosario canyon, is the base of the inclined plane that climbs to Pilares mountain. It is 1900 feet long on a 33% grade, with two trestles over gulches. The tracks are 3-foot gauge, with three rails from the foot to the turnouts and four rails from that point to the top. Being of gravity type, the loaded car carried by the skip in descending carries the empty car and skip to the top. The main cable and pulley wheels in the controlling station weigh twenty-one tons and are anchored in solid rock. The cable wheel is controlled by two steel friction bands with wooden brake shoes. The cable weighs 4000 pounds. The ore cars, of six tons capacity, are steel. They are run onto the incline skips, carried to the top, hauled to the ore bins, filled, returned and lowered to the railroad. With the exception of the ore that is hoisted from the second and third levels, the ore between mine and mill passes almost by gravity. It must be remembered at the same time that the hoisting of ore, its movement to the incline and the incline itself are all temporary arrangements, to be abandoned as soon as the sixth level tunnel is complete. Then all ore from upper levels will be lowered to the tunnel and dumped into the railroad cars. At present, "The General," a twenty-ton locomotive, does the work, but a thirty-ton consolidated is being placed on the tracks.

At the mill terminus a steel trestle extends from grade to the big steel ore bins at the concentrate mill. The track forms a loop near the mill. The loaded cars are dumped and when empty are continued around the loop to the main track.

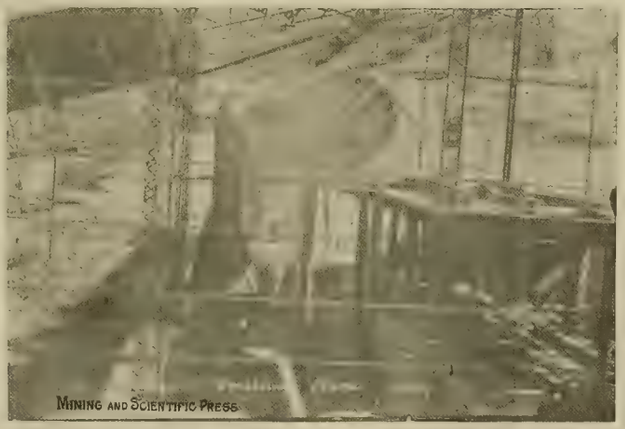
Electricity is the motive power of the entire plant; W. A. Ferguson is electrician. The power house, 108x62 feet, is structural steel sheathed with corrugated iron. A twelve-ton traveling crane, with a 25-foot span, is available the entire length of the building. Eight gas engines, each 40,000 pounds weight complete, rated at 110 I. H. P., with a speed of 200 revolutions per minute, operate eight dynamos. Each engine has two hot tube lamps and outboard bearing that helps support the ten-ton flywheel. They are the regular four-cycle, hit-and-miss type. The gas system is a water gas process, a combination of water gas and hydrocarbon, made in a special apparatus similar to that now in practical operation at the Morenci works. The estimated saving is one-half the cost of steam. The water circulation for the engines is supplied from overhead tanks 20 feet above floor level.

Each engine is belted direct to a 65 K. W., 268-volt, shunt-wound, direct-current General Electric generator, speed 910 revolutions per minute. The current from the eight generators is carried to the switchboard by overhead cables. The switchboard comprises eight generator panels, one main station and one feeder panel. A novel feature of the board is the absence of any volt or ampere meters of the ordinary dial type. Instead, are 25-inch vertical glass tubes, containing a vermilion-colored fluid, in order that its exact altitude or position in the tube may be easily distinguished. The tubes rest against graduated scales, reading amperes and volts respectively. The liquid in the tubes is so controlled by an automatic air compressor that it conforms to and indicates the voltage and amperage generated by each dynamo. The reason for employing shunt-wound, instead of compound-wound, machines is that if any one of the engines should drop its speed below normal, the dynamo of that engine becomes for the time being a motor and does not interrupt the action of the others.

From the switchboard the current is transmitted to the various departments over four circuits of stranded conductor, each having an area of 500,000 miles. Two of these circuits are taken to two distributing boards in the concentrator, where each motor derives its current. The power allotted to this mill is 500 H. P., with additional overload capacity of 25%. Another set of feeders are carried to the smelter and converter blower house. Two 75 H. P. motors are belted direct to the converter high-pressure blowers; one 75 H. P. motor runs the blast furnace blower and a 50 H. P. motor operates the briquette machine, disintegrator and conveyor belt. Exhaust pipes from the gas engine cylinders convey underground the waste products of combustion to the drying room, where a 5 H. P. motor operates an exhaust fan that forces the heat through the room.

In addition, 400 16 C. P. incandescent and arc lamps, constant potential, will be distributed through the mills and the town. A 15 H. P. dynamo, run by a 16 H. P. gasoline engine, is installed at the mine and runs a 10 H. P. motor ventilator and six 15-inch Sturtevant blowers. Ultimately rotary and static transformers may be installed in the power house and transmitted to the mine to operate tramway motors, for lighting and other purposes.

Two large electric power pumps, in addition to the



Looking from Blower Room Into Smelter and Converter Plant, with Concentrator Beyond.

concentrator pump installed in a caisson sunk near the stream below the concentrator building 25 feet to bedrock, will furnish water for town and plant.

The concentrate plant of 400 tons daily capacity, erected and to be operated under the supervision of J. T. Hall, is practically complete. The entire building, 90x200 feet, in which 60,000 feet of masonry was used, is steel-framed and sheathed with corrugated iron. The motive power of the mill is electricity, brought from the central power station and accelerated through motors. A motor is provided for each distinct operative adjunct of the plant, as will be observed from the description that follows.

One noteworthy feature of this mill is that it is and, therefore, should be treated as twin mills of 200-ton capacity each. One mill may be entirely inactive while the other is in operation. Hence, but one of the twins, to avoid confusion, is here described.

The steel ore bin has a capacity of 1500 tons. From here the rock gravitates to a 10x20-inch crusher, operated by a 30 H. P. motor, and falls into a fifty-ton bin, whence it is fed automatically to an 8-foot revolving screen with a ⅝-inch mesh.

The rock that passes through the meshes of this screen drops to eight roughing jigs—four single and four two-compartment. The rock from these jigs passes to the first roughing rolls—a 16x36-inch machine, driven by a 50 H. P. motor. Thence it drops into an elevator boot and is carried up to a second set of two double trommels, the first ⅝-inch and ⅜-inch, respectively, and 16 feet trommel, and the second ½-inch and ¼-inch, respectively, and 16-foot trommel; thence it falls and passes through another set of four tiers, four, three and two four-compartment jigs. The tailings of the four two-compartment jigs are recrushed by 16x36-inch Gates rolls, driven by power from the motor that drives the roughing rolls, and the pulp from these is re-elevated to the trommels last mentioned. The tailings are then massed, and while passing through a straining trough to a narrow-faced, high-speed, 8x56-inch crushing rolls, run by a 50 H. P. motor, the water is withdrawn into settling tanks and is raised 25 feet to reservoir by two No. 6 Rumsey centrifugal pumps, driven by a 20 H. P. motor. This water supplies the roughing jigs. From the crushing rolls the tailings continue through two 16-mesh trommels, are sized to hydraulic dimensions, divided and passed through four four-compartment jigs and eight vanners. The tailings of these vanners are resized, the coarsest are rejected and the balance are passed over four vanners and run off.



Mill Plant and Town of Nacosari.

Black building on left is power house; white building next is machine shop; long brick structure adjacent is briquette dry room, briquette machine to stand at right. Beyond is masonry for coke bin, and the skeleton work near by is smelter and converter building; blow room is hidden by wall and fill at coke bin; ore bins, trestle and concentrator to the right; flue for fumes in foreground, town in background, Baragon mountain in the extreme distance.

The coarsest of the jig concentrates are taken by cars that run on tracks in alleyways between the jigs to the smelter. The finer concentrates are taken by the crane method to the briquette machine. The vanner concentrates and the concentrates from the lower fine jigs are collected and carried by an incline tramway also to the briquette machine. All the jigs, except the lower fine ones, are operated by a 30 H. P. motor. The lower jigs take their power from the vanner motor.

The water for the plant is pumped from a well near the stream and adjacent to the mill to a tank through an 8-inch pipe. The pump is a three-plunger, vertical driven by an independent 30 H. P. motor. The mill will consume 300,000 gallons of fresh water daily.

The mill in full operation with day and night shifts will employ a total of twenty-eight men. The wages to be paid will be at least equal to those paid in other States for similar service; 4% and 5% ore will be concentrated to a minimum of 26%.

From the concentrator the metal passes to a briquetting machine, where it is mixed with clay or lime, is pressed into disc-shaped briquettes, which proceed on cars to the drying chamber—100x8 feet—where they remain twenty-four hours, until hard, whence they are taken by tramway to the feed floor of the blast furnaces.

The smelter building is a steel structure, 175x62 feet, equipped with two 150-ton blast furnaces, two five-ton Bessemer converters, hydraulic pump and accumulators, a tilting matte settler, crushers and pans for grinding quartz used in lining converters, furnaces for drying furnace lining, turntables, hydraulic elevators and other equipment. The building is constructed with three floors of different heights, each projecting like steps beyond the other to permit the passing of all material by gravity through each successive process. Building and machinery rest on massive masonry to withstand weight and vibration. All dust and fumes originating in these departments are drawn into and carried off through a brick tunnel, 6½x8 feet, 800 feet long, to the top of the hill above the railroad, to a brick chimney, 250 feet above the mill. Immediately west of and adjoining the smelter building is the blow house, in which is the machinery described in connection with the power plant.

South of the smelter is the coke bin, 70x30x20 feet, enclosed by masonry walls supporting a roadway from which coke is delivered to the bin from wagons. Near the smelter also are the gas plant and coal storage bins.

Farther south are the machine and blacksmith shops, equipped with lathes, drilling presses, shapers, bolt cutters, pipe cutters and other machinery for repair work. Adjoining and 300 feet from the smelter is the power house, previously described.

North of the mill, across the little stream, is the town. Nearest the stream are fifty brick tenements in two long blocks. Across a plaza, 500 feet long by 140 feet wide, is the hotel, 260 feet long, and the store building, 264 feet long. Farther north are blocks of houses occupied by Dr. Giles H. Hall, company physician, J. W. D. Moodie and other heads of departments. Beyond these, at a higher elevation, is the structure reserved for offices of the company. A brick schoolhouse stands at the west end of the plaza, where a dozen Mexican children attend, an evidence that compulsory education is not the vogue in Mexico.

Upward of 100 skilled Americans are employed, and at present about 350 Mexicans. The latter receive from $1.50 to $2 per day, according to the work performed. The pay of the skilled men is the same as in other camps of the company in the States. When the mine and reduction departments are in complete running order employment will be given to 400 or 500 men in the former and perhaps 350 to 400 in the milling plant. Based on the population of the other camps controlled by the Phelps-Dodge Co., the total population of the camp, settlement and Nacosari town should be between 4000 and 5000 within a year and a half or two years. No ground can be bought anywhere near the company's camps, therefore the festive Yankee real estate agent will have no chance for a long time to come. Neither may independent stores be established on the company's property, nor in the town, until such time as the latter becomes an incorporated village according to Mexican laws, and those conditions are largely subject to the company's control.

Notwithstanding these facts, with the disbursement of at least $1000 per day gold to employes, the demand for provisions will be large, and farm and garden products will bring top prices. Already the ubiquitous Chinaman has caught on and is digging out patches of ground.

The policy of the company to do custom smelter work, together with the advent of the railroad, will prove an immense stimulant to mining in that section. Numerous copper locations and gold and silver properties now assume importance that, without smelter and transportation facilities, were of little value to their owners. I have taken note of the adjacent and tributary mineral-bearing districts and will describe them in a subsequent article.

From Naco, a new town on the international boundary, nine miles southwest of Bisbee, work on the extension of the Arizona & Southeastern is in progress. Forty-pound rails and ties sufficient for forty-five miles of railroad are stored there, and Streeter & Lusk, Chicago contractors, expect to complete this mileage by August. M. W. Wambaugh, C. E., is chief engineer for the company. The country for seventy-five miles permits easy grades and comparatively little heavy work. The route follows a broad valley nearly the entire distance. From there to Nacosari it is through an exceedingly heavy country, penetrable only through box canyons. The charter or concession for the railroad requires it to be built to a port on the Gulf of California. Ultimately, therefore, the line will reach either Guaymas or Mazatlan.

It is not expected that the present plant will be sufficient to handle the ore as fast as it may be produced when the mine has been further developed, and it is probable, therefore, that large additions will be erected.

Cariboo Hydraulic Mining Co.

J. B. Hobson, formerly of Placer county, Cal., now general manager of the Con. Cariboo Hydraulic Mining Co., Bullion, Cariboo district, British Columbia, sends an elaborate report of operations in the season of 1899, with maps, photographs, etc. Some of the photos have been grouped by our engravers in the picture on the front page depicting the workings of that property. The company's property comprises 2,904 acres on the south fork of the Quesnelle river, and covers two ancient river channels. It is one of the largest hydraulic mines in the world. During the season was expended a total of $194,520.51. During the 145 days' run there were used 353,056 miners' inches of water, there were removed 1,952,535 cubic yards gravel, sand, etc., and gold to the value of $92,678.93 was recovered. At the close of the season about 110,000 miners' inches of water remained in the reservoir. The total operating expenses of the company to date is $439,026.12. The total amount of gold recovered aggregates $528,000.

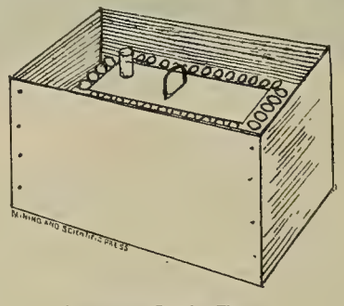
The auditor's report gives a detailed statement of expenses for 1899, among the items of which are: explosives, $38,837 02; labor, $39,068.42; transportation of miners, $4649.26; management, $6436.40; ditch maintenance, $12,174.05; slimes, $6422.11.

It is calculated that the material washed will average over 21 cents per cubic yard, and that it can be treated at a cost of a little over 6 cents per cubic yard. The expense of the last season was largely caused by construction work of a permanent nature, and Manager Hobson expects profitable results from the season of 1900.

An Inexpensive Powder Thawer.

To the Editor:—I have always noticed that the most careless persons in handling Giant powder are prospectors and miners working in a small way, where every cent is needed for "grub" and not even the small cost of a patent powder thawer can be spared. The usual practise of such miners is to lay the powder in the sun to warm. Often when coming out of the mine, when ready to blast, they find the sun has gone under a cloud and the powder is frozen, and the only thing left to do is to thaw it over the forge or a candle with frequent disastrous results. I herewith submit a method of thawing powder which has at least the advantage of costing nothing, and I believe to be absolutely safe:

Take an empty square gallon syrup can, make a wooden box 1 foot deep and large enough inside to



Inexpensive Powder Thawer.

set the can and leave a space 1½ inches all around the can. Line the inside of the box with three or four thicknesses of canvas, put 1 inch of sawdust in the bottom, fill the can with water as warm as you can bear your hand in, set in middle of box and stand sticks of powder upright all around it. It will hold twenty or twenty-five sticks. Stuff a gunny sack down on top and the powder will keep in good condition for twelve hours in the coldest weather. Prepare before starting to work and you will always have powder ready when you want to blast.

Ouray, Colo. MINER.

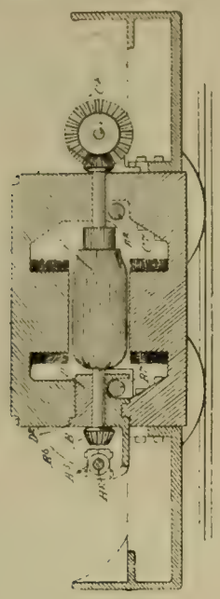
Artificial lumber drying is to have experiment on new lines. Eastern lumbermen handling woods naturally refractory to the accepted process of hot air drying are making a series of tests in lumber drying by a cold air process. The modus operandi is essentially the same as in the hot air process, save that dry cold air is used instead of hot air. The experiments have so far resulted successfully. Lumber subjected to the process is said to show a result in dryness equal to the best hot air process, free from check and stain, and an added advantage is claimed in economy of operation. It is stated that the best and most economical results are obtained with the temperature just below the freezing point. Experiments are now being made to determine the cheaper of two processes of supplying dry cold air to the drying houses.

Latest Mining and Metallurgical Patents.

Patents Issued March 20, 1900.

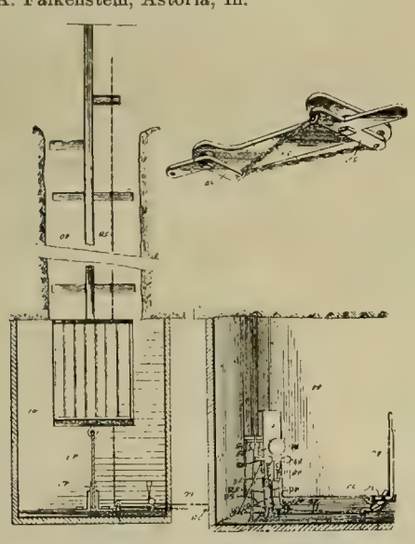
Specially Reported for the MINING AND SCIENTIFIC PRESS.

MINE HAULAGE LOCOMOTIVE.—No. 645,553; C. E. Davis, Chicago, assignor, by mesne assignments, to the Link Belt Machinery Company.



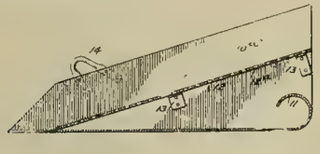
A mine locomotive comprising four wheels, the axle of one pair of wheels being swiveled so as to move with relation to the frame in a plane substantially perpendicular to frame, side couplings between different pairs of wheels comprising a connecting rod provided at each end with concave spherical shaped surface adapted to work on the surface of a ball or sphere surrounding wrist pin projecting from wheels.

MINE SIGNAL.—No. 645,558; J. B. Falkenstein and G. A. Falkenstein, Astoria, Ill.



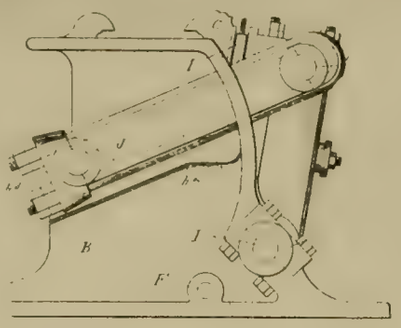
A signal apparatus comprising base, frame pieces mounted thereon, guideways in frame piece, movable signal boards mounted in guideways, racks thereon, additional guideways in frame pieces, movable blocks mounted therein with dogs pivoted in blocks adapted to engage and disengage racks, means for moving dogs into engagement with racks and for subsequently raising dogs to raise racks, pawls adapted for engagement with racks to hold them at different elevations, weighted arms connected with pawls to hold them in operative positions, an alarm comprising elements lying in path of movement of dogs for operation thereby, and means for operating arms to release racks.

GOLD SAVING DEVICE.—No. 645,864; A. M. Lyon, New Westminster, Canada.



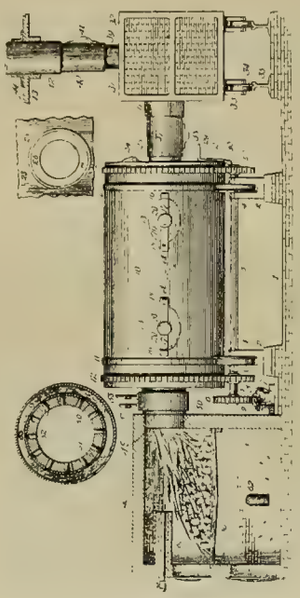
A gold saving dredging and sluicing device, consisting of a box open at both ends, having vertical sides sloping upwardly and rearwardly, a trap 11 extending across rear part of bottom, front part of bottom being of crescent form; in combination with grid or grizzly placed within walls of box with its front end resting on bottom of same and rigidly supported on plane parallel with top edges of sides.

CRUSHING MACHINE.—No. 645,586; M. G. Bunnell, Chicago.



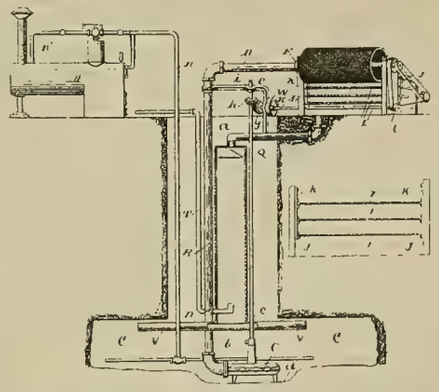
A crushing machine with crushing hopper comprising movable crushing jaw; swinging supporting links having upper ends pivotally connected with lower end of jaw, and lower ends pivotally supported below same and to rear of upper ends; pitman backing and operating jaw; antifriction rolls or balls arranged between jaw and pitman; eccentric applied to lower end of pitman; tension links having rear ends pivotally connected with upper end of pitman and forward ends pivotally connected with frame at points forward of movable crushing jaw.

APPARATUS FOR OXIDIZING OR ROASTING REFRACTORY ORES.—No. 645,761; R. A. Stewart, Kansas City, Mo., assignor to Stewart Oxidizing Company, Colorado.



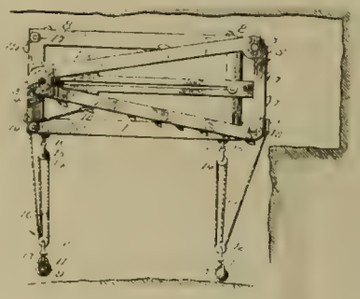
A rotary ore retaining cylinder having a neck passage, a furnace communicating thereto, means for discharging steam and air into neck passage, door closing rear end of cylinder and provided with exit opening and surrounding neck, stationary track, and stack consisting of movable portion provided with wheels resting thereon and stationary portion, the movable part having pipes telescopically connected to stationary portion and to neck of exit opening.

MINING APPARATUS.—No. 645,861; J. A. Laycock, Litchfield, Ill.



Mining apparatus comprising water supply and heating device for mine, centrifugal pump within mine having outlet outside of mine, rotating and reciprocating separator, the outlet pipe in communication with rotating element of separator, vertical revoluble shaft connected with centrifugal pump within well and extending to point above and outside of well, a horizontal shaft having one end operatively connected with pump shaft and opposite end operatively connected with reciprocating and rotating element of separator.

DEVICE FOR MOVING MINING MACHINES.—No. 645,687; S. F. Lechner, Lindentree, Ohio.



Combination of mining machine provided with endless carrier or chain having connected thereto combined cutting blades and draft hooks, pulleys 17 located upon frame 1, pulley blocks 12 and 14, ropes located around pulley in blocks and means for holding ropes in fixed position, means for connecting pulley blocks, ropes to combined cutting blades and draft hooks.

HUMID PROCESS OF EXTRACTING THE METALS BISMUTH OR ANTIMONY FROM THEIR SULPHIDE ORES.—No. 645,490; J. Ranald, London, England.

A process of extracting bismuth or antimony from its sulphide ores consisting in crushing the ore to be treated, bringing a solution of ferric chloride to or about boiling temperature, introducing the crushed ore into the solution while at the stated temperature, separating the liquor from the tailings, precipitating from the liquor the bismuth or antimony by means of metallic iron, then converting the ferrous chloride thus produced to ferric chloride and metallic iron in quantities the same as those originally used and repeating the operation with another charge of crushed ore using the same ferric chloride and metallic iron for this charge and so on with each charge of ore.

The Fastest Vessel Afloat.

The British torpedo destroyer Viper, which recently speeded 35.5 knots an hour, is the fastest vessel afloat. A speed of 35.5 knots is nearly 41 statute miles per hour. The Viper's principal dimensions are: Length, 210 feet; beam, 21 feet; displacement, 350 tons. The indicated horse power is about 11,000. The turbine engines are in duplicate, and consist of two distinct sets, one on each side of the vessel. There are four screw shafts in all, entirely independent of one another, the two shafts on one side being driven by one high and one low-pressure turbine respectively. The two low-pressure turbines drive the two inner shafts, and to each of these shafts a small reversing turbine is also permanently coupled and revolves idly with the shaft when going ahead. These reversing turbines provide sufficient power to drive the vessel astern at a speed of 15 knots. The screw shafts are carried by brackets, as usual, and two propellers are placed on each shaft, the foremost in each case having a slightly lesser pitch than the after one. There are thus eight propellers in all. The thrust from the screw shafts is entirely balanced by the steam acting on the turbines, so that there is little friction.

The boilers, auxiliary machinery and condensers, are of the type usual in such vessels, but their size is somewhat increased to meet the much larger horse power to be developed. This compensates for the lesser weight of the main engines, shafting, propellers, as well as the lighter structure of the engine beds. The boilers are of the Yarrow type.

ON a reasonable computation stratified rocks attain an average thickness of 100,000 feet. While some of the sedimentary rocks have grown a foot in 730 years, others have taken 6800 years to rise to that height. Thus the period of time that was required to build up 100,000 feet of sedimentary rock has varied, according to locality, from 73,000,000 years to 680,000,000 years, and this gives us some idea of how old the world is. The active work of creation lasted at least for a cycle intermediate between these two figures. Since man began to observe, there has been no change in the forms of animal and vegetable life. A few species have disappeared, but not one new specimen has been evolved. The fauna and flora of ancient Egypt, depicted on monuments, which are probably 10,000 years old, are identical with those that are found in that country to-day, and shells which inhabited our seas before the ice age are the same species that are found in the waters of our bays to-day. But how vast the shortest period we can assign to the gap that divides us from the remote period when these animals and vegetables were first created. Gradually the geologist is lifting the veil which covers the prehistoric record of our planet.

Prospectors' Mistakes.

NUMBER I.

Written for the MINING AND SCIENTIFIC PRESS by "A PROSPECTOR."

Fallacious ideas innumerable afflict the average prospector. By average is meant not half but nine out of ten. In the search for gold mines the intent of the prospector is to find a deposit of rock, be it in whatever form it may—veins, large or small, or dykes, reefs or whole mountains—that will yield a sufficient quantity of gold per ton to give a profit in mining and reduction. Yet how few, in their hunt for gold, realize or even think of just what is meant by cost of mining and reducing.

A prospector finds float and horns it. It contains free gold. He looks farther and finds the ledge. He immediately proceeds to trace its course and locate it. After uncovering portions of the vein he picks out several pieces—invariably pieces that look best and containing more mineral than the rest—takes them to camp, crushes and pans them. A few of the pieces, or even all of those he has selected, prospect well—$5, $10, $20 or even $100 per ton in free gold, according to his estimation. This particular prospector, being one of the majority, has not—although you could not make him believe it—the least idea how much gold from a small piece of rock must be shown, in horn or pan, in order to prove the ton to contain $5 or $10, far less the amount necessary to show a $100 prospect.

Not only has this prospector deceived himself as to the value of the samples he has panned, but extends the fallacy by imagining the whole ledge to be equal in value to or approximating the value he has placed upon the samples.

Having proven to his satisfaction the value of the ore, he proceeds to explore it underground. He may go to the trouble of building a house or he may have a tent, yet he spends some time in getting ready for work. He works day after day in running a tunnel, or, if he has help, in sinking a shaft. Generally, though, he starts a long crosscut tunnel to "tap the vein deeper"—which sounds very well to one who has never tried it.

He continues such work until, during the interval in which he has not had to rustle for another grubstake, he has contrived, by hard work and by spending all the money he has been able to earn in a year or so for provisions, powder, etc., to run his tunnel in to the ledge, and perhaps drift a few feet, if he has found a ledge at all where it ought to be.

He has now proven (?) that he has a mine, as it horns where he cut it with his tunnel, and forthwith proceeds to find a purchaser for his claim or some one to put up a mill for an interest.

If there has not already been some one along who has examined his find, all he has to do is to proclaim the fact that he has a mine for sale. Some one who knows a prospect worthy the name, when he sees one, will go and see it, willing to buy or put up any amount of money to develop it, if there is the bare possibility of its proving to be a profitable undertaking.

If this prospective purchaser cannot see at a glance, or satisfy himself by horn tests, that there is nothing there, he will sample what ore is in sight and have the samples assayed. He may find that the ore is not worth $1 per ton on the average, and so notifies the owner of the crosscut tunnel. If this prospector has common sense he will consider the advice of this man and see for himself that he has put all his labor and money where, from the start, there was absolutely nothing to even encourage him to locate the ground. If he is like some of his kind, however, he will consider the expert, or whoever he was, a bilk and "don't know what he is talking about."

Another job and a few dollars earned finds him back again, even if only to do the assessment work, and so on until he is compelled after several years, and as many vain attempts to interest some one with money, to realize that his mine is not what he thought it was.

What a simple matter it would have been for this prospector to have taken a few samples of average ore that he had found on the surface and, by mixing and the exercise of a very little judgment in reducing the bulk, to have secured a sample or two that would have told him, perhaps not accurately but nearly so, the value of such ore. If he was satisfied that the values were wholly in free gold, it would have been an easy matter to weigh a pound of the ore and pan the gold out; and if he could find no means of weighing the gold he could find some one who could tell the difference between a trace, a color, and a cent to the pan. If he obtained a cent he would know that there would be $20 in a ton; if he got but a few colors he ought to have known that his ore was too low grade to even justify looking further. If this prospector did not like to trust his own calculations, two or three assays, costing $2 or $3, would have saved him all the work and money he has thrown away.

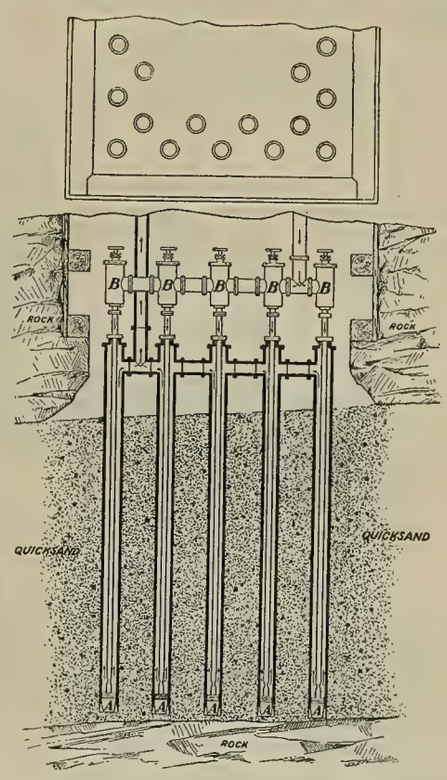
The mistake of this prospector lies in imagining that because his prospect shows some free gold he must naturally have a mine, without stopping to consider the exact or even approximate value per ton in dollars and cents, the amount of ore in a section of the vein necessary to admit of reasonably cheap mining, the cost of milling, etc., without counting the cost of a mill, the cost of putting his prospect in shape to extract ore, and the amount of ore of a certain grade necessary to justify all these expenditures.

(TO BE CONTINUED.)

Mining With Aid of Refrigeration.

At Lake Superior, and elsewhere, dolomite quicksand is frozen into solidity and then a shaft sunk through as though the substance were solid rock. The sand shaft at the Trimountain mine was dropped through sand to bedrock, a distance of 106 feet, in five weeks. At the Wyandot, ten miles south of the Trimountain, they have been trying for a year to get sand pipes through the overburden or sand and have not yet succeeded. W. S. Smith has frequently found it necessary to sink stand pipes in a circle all about a sand shaft and freeze the shifting sand to solid rock by circulating ammonia in the pipes. This is an expensive process. The Trimountain shaft has cost considerably less.

In Poetsch's freezing apparatus, herewith illustrated, the object is to absorb heat from the quicksand; this is done by causing an intensely cold fluid to circulate through a series of tubes, so disposed that each absorbs a share of the heat to be abstracted. The cold fluid is made to circulate like air in a mine, and by reference to the illustration it will be seen that there are intake and return currents,



Poetsch's Freezing Apparatus.

and even splits in the circulation. The intake or downcoming current enters the inner tubes as shown at B, B, etc., and the absorption tubes envelop the small inner or intake tubes that are 2½ inches in diameter, while the return tubes are 8 inches in diameter. The circulation may be noted by observing the ascending fluid returning by the arrows as at A, A, etc.; further it will be noticed that the cold fluid is supplied by a main return and a main intake tube. The circulation of the cold fluid is continued until an ice dam 5 feet thick is formed round the shaft, then the frozen sand within the shaft is taken out, and the sides are secured with a permanent dam of wood, cast iron, stone, or brick. For fixing the absorption tubes in the sand the bottom as well as the top ends must be left open, because otherwise the buoyant power of the quicksand would prevent the easy entry of the tubes. After the tubes have been sunk into their required position, lead plugs are dropped into them to close the bottom ends which have a contracting taper; after this the sand is removed from the insides of the tubes, and the plugged ends are made tight by covering the heads of the plugs with alternate layers of pitch and cement, the object of the cement being to fill the cracks in the layers of pitch, for if the absorption tubes are not perfectly tight the escaping fluid prevents the freezing of the sand, by the diffusion of the chloride into the water.

Sinking vs. Tunneling in Development Work.

TO THE EDITOR:—In a recent issue of your paper, I note the following statement: "As between tunneling and sinking to strike the vein, the advantage ordinarily lies with sinking. The tunnel is self-draining; it needs no hoisting machinery; the cost per foot is less; timbering is easier provided for. Where the enterprise is not on an unusually large scale, and the distance is not over 3 feet of tunnel to 1 foot of shaft sunk, the tunnel is deemed preferable. Of course, special circumstances govern every case and no general rule can apply."

Being one who, in the earlier part of my mining career (which has now extended to nearly thirty years), followed the above rule, entitles me, I am vain enough to believe, to the right of asking permission to challenge the aforesaid method of mining. It does not follow that, because a man has seen nearly thirty years in mining, he knows it all, or that he should criticise and put himself forward as a competent judge as to the proper system of opening up and operating mines; yet to him who has learned something by reason of the application of a practical knowledge, with that of a theoretical one during an unbroken experience of a quarter of a century, should be due some consideration for an opinion involving so vital a question to the welfare of mining.

I can not reconcile myself to the belief that it is right or that it is proper mining to tunnel 300 feet and get but 100 feet of a vertical depth or stoping ground, nor any greater distance at the same ratio. To my way of thinking there are only two reasons—and only one of them is right—why tunnels should be driven at all, i. e., a natural tunneling location or proposition, as the miner says; the other reason is extreme poverty on the part of the owner or owners. Of what use is it, let me ask, to drive a tunnel 300 feet—we are now speaking of crosscutting—to strike a vein when such shallow depth, in eight cases out of ten, taps the lead and finds it in an impoverished condition, proving nothing, you might say, as to its permanency? The poor owner is now confronted with the question or conditions as they were in the first place, namely, a $400 hoist and the sinking of a shaft. Because tunneling can be done a little cheaper does not make such methods justifiable or repair the mistake. The fact that a "tunnel is self-draining" should not serve as an inducement to drive one, for, finally, pumping machinery must handle this water. To ventilate a shaft does not cost any more than that for a tunnel. A tunnel 300 feet in length, which cost, we will say, $7 per foot, will sink a shaft of ordinary size 210 feet; and if the vein be a vertical one, and the shaft is sunk on it, it will assist largely in paying its way in its development. A tunnel driven 600 feet to give 200 feet of "backs" would cost, at the rate of $7 per foot, $4200. This amount would sink a shaft of suitable size 200 feet, buy the hoisting and pumping machinery, cage, cable and a good size air compressor—everything complete and sufficient to sink and develop the mine to much greater depth.

Throughout the mining districts of Colorado, California, Oregon and Washington the silent, graveyard-like appearance and condition of numerous good prospects and mines give refutation to the tunneling fallacy. The poor owner, after "gophering" and "stumping" at grass roots and tree roots, having wearied of futile efforts to make a good, profitable mine of his property at the enormous depth of 100 feet, is now "resting" and waiting for the capitalist to come and buy him out. The capitalist comes—of course he does—and he knows a good thing, or his expert does, when he sees it. He buys him out for half, or less, of what it is worth. The capitalist equips the mine and in very short order strikes it big, and demonstrates just what the other fellow would have done "if he had had a little more money." Had the poor owner bought nothing else but a whim, he would have attained sufficient depth that would have enabled him to judge of the true value of his mine.

In a large majority of cases a depth of only 100 or 200 feet upon a true fissure vein proves nothing, and a tunnel extended to tap the ledge at such shallow depth is almost a dead loss; its usefulness for the further and future working of the mine practically ends at its level. It remains there a glaring and constant reminder of a costly blunder. However, if the poor or otherwise mine owner or prospector be not an expert himself, he should, in the first place, seek some such advice. Experts of all descriptions abound everywhere; the woods are full of them; they are in evidence in every mining camp, village and hamlet. Their advice has accumulated to such an extent that it has gushed over, permeated and saturated the atmosphere so that it is dirt cheap and can be had without the asking. The man with the tripod on his shoulder; the man with a miniature compass dangling at his watch charm; the hungry theorist who has devoured Le Conte and Dana in volumes; the mine promoter; the clerk in the mining company's office; and last, but not least by any means, the metallurgical crank and the assayer—all are experts. It requires, though, an expert of another kind to pick out the real competent expert of mines from the fakir and impostor.

J.

Spokane, Wash., March 19.

MINING SUMMARY.

ALASKA.

The United States Government forbids the carrying of gasoline on any steamers carrying passengers to Cape Nome. The Standard Oil Co. says it will place as much gasoline at Nome as will be necessary to meet the demand.

A Cape Nome letter says: "The country is being staked and re-staked from the Arctic to the Yukon. All the claims staked in '98 were re-staked on the 1st of January, and some claims are as full of stakes as were the claims in Atlin. Kimball & Co., of San Francisco, have a preliminary survey for a railroad along the beach from Port Safety to Port Clarence, eventually to connect with Siberia by means of a tunnel under Behring straits. This is regarded as a scheme to lay under tribute the coveted beach diggings."

At Victoria this week a combine of the Canadian Pacific Navigation Co., White Pass & Yukon Railway Co. and the John Irving Navigation Co., to control all transportation business during the present season, has been completed. Through freight rates have been fixed at $97 a ton on general merchandise in less than five-ton lots, or $87 for larger shipments. The mining machinery rate is $67, with a limit of measurement.

ARIZONA.

GILA COUNTY.

Supt. Cook of the United Globe has fourteen boxes of copper specimens for the Paris Exposition, none of which go less than 25% copper.

The Old Dominion C. M. & S. Co. has 125 men employed to maintain organization, says the Silver Belt.

The Black Warrior Copper Co., Amalgamated, has a great flow of water, more than required to run the entire works, to which the water will be piped two and a half miles. Five carloads of 4-inch pipe will be used.

An Old Dominion stockholder says: "During January the Old Dominion produced 500,000 pounds of copper and during February this production was increased to 700,000 pounds. The Old Dominion development work is three years ahead. The mine will start up whenever a supply of coke can be secured. When new stock now in the treasury is issued, the proceeds will be used to build a railroad from the Old Dominion to the Continental mine.

GRAHAM COUNTY.

Near Clifton a strike is reported in the Shannon mine of copper sulphide.

Thirty miners are at work in the Ash Peak district, principally on the Commercial group.

The Belle mine, on the reservation strip, is bonded to the Mt. Turnbull M. Co. for $75,000 for twelve months. Men are to do development work.

MARICOPA COUNTY.

Operations of the smelter combination of the Rocky Mountain region, which forced the closing of the pyritic smelter at Silver City, N. M., have affected the mining industry of Arizona, principally in the northern part of the Territory. "The output of copper ores from northern Arizona has been curtailed because some of the ore will not permit of treatment by any other than a pyritic process," says H. P. Anewalt to the Prescott Herald. "By the closing of the Silver City works all avenues for sending pyritic ores to a plant where they can be profitably reduced have been cut off—in fact, the Silver City smelter was the first and only plant to successfully treat pyritic ores and its shut-down knocks out a considerable reduction of copper." According to this the McCabe and Gladstone mines of the Big Bug district, which were important producers of pyritic stuff, have been forced to suspend shipments and operations are now confined to development. The outcome of the Silver City smelting troubles is not encouraging to the Big Bug district, where the ores are heavily impregnated with sulphur and lime, although if developments continue, as they have in the past, the inability to ship ores may prove beneficial to the mine owners by creating the necessity of smelting ores close at hand.

YAVAPAI COUNTY.

(Special Correspondence).—The miners of the Big Bug district are looking with interest to the completion of the Clifford stamp and Cornish roll mill that is to work on the Great Belcher and other ores. The mill will have a daily capacity of 500 tons, and it is expected a low cost of extraction will be reached which would enable many low-grade properties to work. Most ores of the Big Bug district are sulphides, adapted for concentration. The Great Belcher mill will be fitted with Comet & Blake crushers, two sets of Cornish rolls, 36x18 inches, and four sets of Cornish rolls, 30x10 inches. There will be eighty stamps, forty-six concentrators, a roasting furnace with fuse box attachments and a cyanide plant to treat tailings. The intention is to make it one of the most complete concentrating mills ever erected in the United States; the entire cost will closely aggregate $400,000. It is understood to represent the private capital of Henry B. Clifford & Co. A railroad nine miles in length will connect the works with the mines of the Big Bug district.

Prescott, March 26.

The Journal-Miner says that the Zonia Copper Co., whose properties are tributary to Kirkland station, is figuring on putting in a $100,000 leaching plant to work a body of low-grade copper ore.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—At the Shenandoah Supt. Thornton has a 4-foot ledge of ore that averages $17.50 in gold and $6.25 in silver per ton. He has leased a mill and will begin milling next month.

Plymouth, March 27.

BUTTE COUNTY.

At Oroville it is locally reported that during six days one of the several gold dredgers made an average of $600 a day.

One of the new dredgers on the Feather river between Biggs and Oroville begins next week, the other two weeks later. They will be operated by electricity, under the supervision of A. Berner. The new dredges were constructed after the patent of R. H. Postlethwaite by the Risdon Iron Works of San Francisco, which company will construct another dredge for the Merrigold M. Co., to be operated on the opposite side of the river. The Feather River Exploration Co., after operating the first dredge more than two years, have expended about $80,000 for the construction of two more, which are about completed.

L. Glass and F. McLaughlin have an option on the Big Bend tunnel on Feather river, twelve miles above Oroville, and on adjoining land owned by the same company, together with the water rights, etc., and propose to install an electric plant. The latter is East to interest capital in the scheme.

CALAVERAS COUNTY.

The Melones M. Co.'s gross receipts for the year ended Dec. 1, 1899, were $267,135, expenses $266,836. Ore reserves available for milling at the end of the year were 982,692 tons; probable reserves, 1,651,153 tons. As soon as lumber can be delivered at Robinson's Ferry, work will be resumed on the 120-stamp mill and other works. There will be then 250 men at work in that locality.

EL DORADO COUNTY.

The Democrat reports that J. Lavagnino will work the dumps of the old Union or Springfield mine and that he will build a 10-stamp mill.

At the Kimble mine at Placerville the Republican says Supt. Kimble employs forty men, taking out hard cemented blue gravel from breasts 40 to 75 feet wide and from 2½ to 9 feet deep, which is carried over T rails an average distance of 2000 feet to the ore bin, whence it passes through self-feeders to the ten stamps. The gravel is composed of quartz, slate and rhyolite lava pebbles imbedded in the cementing material. It is all blasted. The bedrock is slate of medium hardness. The stamps are 650 pounds with from 5 to 6 inches drop and a speed of from 96 to 110 drops per minute. A coarse screen and high discharge are used. The discharge is 6 inches with a four-hole screen, 14 inches wide. When the crushed gravel comes from the mill after this process, the cementing material is entirely dissolved into its constituents of sand, mud, etc., and the pebbles of slate and quartz are crushed to about the fineness of grains of wheat. A saving is effected in getting rid of this hard material without crushing it unnecessarily fine, as it contains no gold. No quicksilver is used in the battery and no plates are used anywhere. The tailings flow over a series of riffles perhaps 50 feet in length. They are wooden "cross-riffles"—that is, at right angles to the flow, each beveled from the upper edge of its lower side at an angle of 45°. The result is a peculiar action of the water by which it dances as though a heavy rain were falling in it, and the sand between the riffles never packs, but remains open to gold deposit and amalgamation. The mill can dispose of 322 carloads—1300 pounds each (the capacity of the ore bin)—in a run of twenty-four hours. Power is developed by a 6-foot wheel under a pressure of 176 feet. Wages in the mine are $2.50 for miners and $2 for carmen working shifts of nine hours. Supt. Kimble finds that he is able under these conditions to mine and mill gravel at an expense of 50 cents per carload of 1300 pounds. During one month's run, where no interruptions in the gravel supply occurred, he was able to reduce the cost to 42½ cents per carload. This includes all mine expenses, cost of superintendence, powder, lights, shoes and dies, etc.

INYO COUNTY.

J. Danielson has sold his interest in the Bunker Hill lead mine, Lead canyon, to R. J. Laws for $4000.

The Kearsarge mines, seven miles from Independence, are to be opened by San Francisco men. A 1500-foot tunnel will be run and a mill and cyanide plant erected. J. S. Johnson is Supt.

KERN COUNTY.

The Californian says that Jewett & Blodget have sold their oil properties at Sunset for $500,000 to English purchasers.

Near Bakersfield the Petroleum Development Co. is pumping from nine wells and is boring four others.

The Santa Fe R'y Co. is putting in fuel tanks all along the line and will soon have all its engines converted into oil burners.

At McKittrick J. B. Treadwell has finished his sixth well which is being sand-pumped. Of the five producing wells four are flowing.

At the President the depth of 850 feet has been reached.

McKittrick is producing four carloads of oil daily.

KINGS COUNTY.

The Baby Kings well is reported daily producing forty barrels of oil.

LOS ANGELES COUNTY.

The Los Angeles O. & T. Co. says a deep well will be drilled to the primary oil sand on their property. The Johnson well has been drilled 1400 feet—the deepest well in the Los Angeles oil district. That well is yielding fifty barrels a day, oil and water flowing over the casing. This will be shut off and the well drilled still deeper.

MADERA COUNTY.

The Eastern agency of the California Copper Co. has a shipment of fifty tons of copper matte from Madera valued at $15,000. The smelter of the company is reported to be handling 100 tons of ore per day.

MARIPOSA COUNTY.

Mgr. Madden, at the Francis mine, Mariposa creek, has fourteen men at work on the mine.

NAPA COUNTY.

The Napa Quicksilver M. Co.'s statement for the three months ending March 1 shows: gross receipts, $60,750; operating expenses, $37,395; dividend, $20,000; surplus, $3354.

NEVADA COUNTY.

(Special Correspondence).—Work has been resumed at the Orleans mine, adjoining the Empire on the east, one and one-half miles southeast of Grass Valley. Several miners, headed by C. A. Brockington, formerly Supt. of the Orleans, have taken a bond on the property and are working it on the co-operative plan. They are driving toward the Heuston Hill ledge on the 700 level. This was a rich lead, having produced $500,000 in early days. As they will strike it considerably below the old workings, they have hopes that it may amply reward them for the vast amount of dead work which they will be obliged to do to reach the ledge. There is a good hoist on the Orleans, run by water, and a Cornish pump, and as the mine drains into the Empire there is no trouble with water. The air compressor is run by a 30 H. P. electric dynamo. Water power is used at the 5-stamp mill. The shaft is 800 feet deep.

Development work continues at the Golden Treasure mine, south of the W. Y. O. D. The shaft is 165 feet deep. A drain tunnel takes the water at the 105-foot level. The steam single-reel friction hoist anchored in cement will answer all requirements to 1000 feet depth. The shaft follows the ledge and considerable good ore has been taken out. Frank Dulmaine is superintendent.

The Golden Gate Exploration Co. are operating north of the Maryland mine, near Grass Valley. Their claim adjoins the Alpha on the west. The shaft follows down on the ledge and is 430 feet deep. A drift is being driven west. The ledge averages 15 inches. The equipment consists of a single-reel hoist and a duplex pump, both run by steam. The stockholders are California people, whose interests are well looked after by G. R. Tuttle, superintendent. Twelve men are employed.

The Standard mine, two and one-half miles northwest of Grass Valley, is one of the latest enterprises to begin work. It is an old claim, but nothing had been done upon it for many years until it was taken in hand recently by Hugh J. Thomas, formerly of Colorado, who is Supt. for the San Francisco and Berkeley stockholders. The old company ran two tunnels, one of which struck the ledge at 75 feet; the other tunnel ran into the hill 475 feet, passing through the ledge, which has been found by the new company 325 feet from the mouth of the tunnel. They are now drifting both ways on the ledge. It has widened out from 3 feet on the west to 30 feet on the east, and shows much good ore. A mill test of selected portions yielded $66 per ton.

The Hudson is a mine in Nevada county which is attracting attention at the present time for the reason that it is located many miles from any other active property. It is on the north bank of Deer creek, three miles northwest of Rough and Ready, adjacent to early placer diggings along the creek. A stamp mill was placed on the property twenty years ago, and considerable ore was milled without using concentrators or blankets. The tailings from this mill, as well as much waste rock thrown aside by the old company, but which is found to prospect well, are to be run through the 4-stamp mill now being erected. The shaft at the Hudson goes down on the ledge and is 184 feet deep. The ore is free milling above water level; below that point it carries copper and is heavily sulphuretted. The ledge is 3 feet thick and inclines to the east about 70°. The new company has cleaned out an old Excelsior branch ditch and by laying 1200 feet of pipe will secure a head of 300 feet, enabling them to run hoist, pump and mill by water power at comparatively light expense. Thirty tons of tailings and ore can be daily run through the mill. The company is composed mainly of San Francisco business men. E. R. Rockwood is president, H. W. Matthews secretary, J. W. Morrow superintendent, C. W. Gertridge accountant and business manager, J. T. Strickland foreman. Superintendent Morrow thinks he has a valuable gravel proposition on the land of the company a short distance below the mill.

The Jenny Lind mine, near Grass Valley, was originally a promising gravel proposition. While running a tunnel into the hill a year ago to strike the gravel channel a quartz ledge 2 to 4 feet thick was found. Crushings have been made therefrom, with results so satisfactory that the company contemplates the erection of a 10-stamp mill. Another tunnel, now being driven, will give sufficient backs to supply a mill. This is a local company, with Wm. Treloar president, Arthur Powell secretary and Charles Stocks superintendent.

Work in the Holbrooke gravel mine, on the Rough and Ready ridge, southwest of Grass Valley, has been discontinued. The pump has been removed to the Seven-Thirty quartz mine, to the south. On the south slope of the ridge I. Haas, I. Stein and Chas. Melish of Grass Valley own 140 acres, through a portion of which the Holbrooke gravel channel courses. Geo. Martel and Mr. Melish have the property leased. They have taken gravel out of a self-draining tunnel and by sluicing have got considerable gold. The gravel is not cemented. They are now preparing to run another tunnel near the center of the channel. This claim is known as the Alta-California and has been worked off and on for eighteen years.

Still farther along on this channel is the Sazerac gravel claim, which is being worked on a lease by Jas. Gluyas, W. W. Dibble and Cyrus McMath of Grass Valley. These miners have explored their ground to some extent by tunnels and drifts, but were embarrassed by the water backing up on them. They have leased the old Smedley tunnel, opening into lower ground, and are reaching their gravel bed through drifts therefrom. The character of the gravel is improving. It is cemented and put through an arrastra, run by water piped 700 feet and giving 150 feet pressure. They work about twenty cars of gravel per day.

Grass Valley, March 20.

The Orleans Con. M. Co. has incorporated at Grass Valley; capital, $100,000; M. W. Fox, G. P. Thurston, G. D. Gray, J. W. Swift, H. B. Montague, directors.

SAN BENITO COUNTY.

The New Idria Quicksilver M. Co.'s statement for the three months ending Feb. 28 shows: gross receipts, $47,475; operating expenses, $24,405; dividend, $20,000; surplus, $3069.

SAN BERNARDINO COUNTY.

At Havilah the Warrington mine has paid off all the indebtedness and work will be resumed.

SAN DIEGO COUNTY.

The new cyanide plant at the Golden Cross mine at Hedges started on the 24th. It has a daily capacity of 333 tons of tailings. By June it is expected the capacity will be increased to 1000 tons. It is contemplated to enlarge the present mill to 200 stamps. Water is pumped from the Colorado river, twelve miles.

SAN JOAQUIN COUNTY.

The Crown Mills of Stockton have bored a gas well 2000 feet deep and have a daily supply of 18,000 feet of gas. The cost was $5000.

SHASTA COUNTY.

(Special Correspondence).—Two feet of $140 ore was recently discovered in the

northern portion of the Summit mine, seven miles northwest of here. Good ore is being stoped in the 400-foot upraise of the lower Summit tunnel. The owners of the north extension, Barlow & Co., of the Summit, are preparing to develop that property.

Ono, March 25.

The statement that the Mountain Copper Co. had raised the wages of the miners, muckers and timbermen employed at Iron Mountain is denied by the Free Press.

Mgr. Filius will put in a 6-drill compressor at the Shasta King group, and projects the use of water power from Squaw creek.

At De Lamar's Bully Hill mines a water jacket of 150 tons daily capacity will be built, and a converter big enough to handle the matte of three such furnaces. No refinery is in present contemplation.

SISKIYOU COUNTY.

(Special Correspondence). — At the Knownothing mine, G. W. Grayson & Co., owners, on Knownothing creek, Supt. Foley keeps its 8-stamp mill running on good ore. The source of supply is a shaft now 115 feet deep showing 3 feet of pay ore.

Its neighbor, the Gold Run group, is sinking a winze, now 90 feet in depth, with power drills, in its lower tunnel. The 4-foot vein in it, including considerable waste, mills $8 per ton in free gold, although the main ore body of the Hunter vein has not been reached yet.

Yreka, March 28.

Contestants are given further time to protest against the application of the railroad for certain lands and to file proper affidavits. In response to a query as to what a "proper affidavit" is, the Commissioner of the General Land Office says:

Where entry has been allowed and remains of record, the affidavit of contestants must be supported by the affidavit of one or more witnesses.

Proof of mineral location should be made by filing certified copy of location notice, and it should be shown whether the mining claims cover all or only a portion of the tract protested.

The protest attacking a claim of record should be supported by all the evidence of which the case is capable.

Protestants will receive notice of this ruling and will then be allowed sixty days to make protest in compliance with the rulings. After this the department will order a hearing at its pleasure.

TRINITY COUNTY.

About 100 men are to be put to work next month on the Paulsen properties on Trinity river, recently bought by the Last Chance M. Co. The purchase included the Union Hill mine near Douglas City, one-half interest in Dutton claims near Weaverville comprising 1670 acres; the price was $125,000. W. H. Hile is Gen. Mgr. and expects that his company will have the mine in full operation July 1st.

YUBA COUNTY.

Constructing the four restraining barriers in the channel of the Yuba river near Deguerre Point will begin when title has been secured to the necessary land. It is expected 1000 men will then be at work.

Irvine & Co, of New York City, are interested with W. Kolman, lessee New Blue Point mine at Smartsville, to operate the property by milling. Two cement mills, with a daily capacity of 500 tons, will be used.

TUOLUMNE COUNTY.

Supt. Hardy of the Santa Ysabel, near Stent, is not doing much at present. The Boston owners contemplate reorganization. The committee for that purpose report as follows:

"The experience of other mines near this property on the mother lode has shown that when ore has proved of little value near the surface pay ore has usually been found again at a depth of from 1200 to 1500 feet. Judging from what we have been able to learn of the appearance and record of the mine and its reputation among mining men, the committee feels that it should by no means be abandoned as a failure, but that an effort should be made to find pay ore at greater depth. The appearance of the ground at the Knox & Boyle chute especially warrants further development. The exact line which should be taken to accomplish this development, and the depth at which the attempt should be made to find the pay ore, must depend upon the advice of the expert who will soon examine the property.

"The debts of the company which must be provided for amount to $65,000, of which $34,000 are notes payable falling due in November and January next, besides certain current liabilities incurred with the approval of the committee since the mine was shut down about March 1. The capital stock of the company is 130,000 shares of $5 each and is not assessable. In order to provide the necessary funds the committee recommends that a stockholders' meeting shall be called in Cheyenne, Wyoming (the legal domicile of the company), as soon as practicable, to act upon the following proposition:

"That all the property of the company be sold at private sale for an amount sufficient to pay its debts, to a new company to be organized under the laws of Colorado, with 150,000 shares of the par value of $5 each, assessable, but assessments not being collectible against other property of the stockholder, the right being reserved to each present stockholder to receive an equal number of shares in the new company of the same par value, upon paying $1 per share, the remaining 20,000 shares to remain in the treasury of the new company, subject to sale by the directors for the benefit of the property. As many of the holders of notes payable have signified their willingness to extend the time of payment, we recommend that the trustees of the present company be authorized to accept from the new company a satisfactory agreement to assume any debts, if satisfactory to creditors, and the obligation of the present company is released.

"We recommend that an underwriting subscription should be made to take the shares of the new company not taken under the terms above stated within sixty days from notice that the new company is ready to receive subscriptions at $1 per share, without commission, any stockholder to have the right to join the underwriting with others, and allotment to be made as nearly as practicable pro rata among the underwriters, except that preference shall be given to such stockholders. We recommend Colorado as the domicile of the new company, being advised that the laws of that State are most favorable for the kind of organization that we propose. The number of trustees of the present company is nine; under the laws of Colorado any number of directors from three to thirteen is permitted. We recommend that the number remain at nine. Mr. Charles Pfaff has consented to accept the presidency of the new company. Of the remaining directors we propose that one-half be selected from stockholders not on the present board. The new company will take new officers and elect its own officers. We expect to submit to present stockholders, before they shall be called upon under the above plan to pay the assessment, the report of the expert on the property and the best way to develop it, but as the course we recommend will occupy at least a month we do not deem it desirable to postpone action until the report can be made. We desire that operations shall be resumed as soon as possible for several reasons, chief of which is the fact that at present ample power can be secured from the water power of the company at a minimum of expense, and this power may be lacking later in the season. W. B. Buckminster, E. H. Mason, W. F. Fitzgerald, W. D. Middleton."

COLORADO.

The official U. S. Mint reports of the mineral production of the State of Colorado in the year 1899 as revised is received, as follows:

COUNTY.	Value of gold.	Coinage value of silver.	Total value of gold and silver.	Value of lead.	Value of copper.	Total value.
Arapahoe	$ 62	$ 1	$ 63	$	$	$ 63
Boulder	542,631	97,758	640,389	1,250	13,720	655,359
Clear Creek	541,663	1,654,628	2,196,291	197,131	50,999	2,444,421
Chaffee	214,617	188,576	403,193	53,256	130,324	586,773
Costilla	199	1	200	....	....	200
Conejos	5,911	29,418	35,329	....	....	35,329
Custer	951	7,683	8,634	37,357	161	46,152
Dolores	46,259	298,761	345,020	17,857	4,583	367,460
Eagle	45,677	56,816	102,493	53,027	1,021	156,541
Fremont	8,141	3,422	11,563	50	1,156	12,769
Garfield	641	10	651	....	....	651
Gilpin	1,976,887	436,223	2,413,110	58,579	180,593	2,652,282
Gunnison	69,451	93,406	162,857	62,465	8,039	233,361
Hinsdale	37,991	199,518	237,509	471,924	8,647	718,080
Huerfano	41	....	41	....	....	41
Jefferson	749	312	1,061	34	43	1,138
Lake	2,183,332	9,383,918	11,567,250	2,174,876	1,228,463	14,970,589
Larimer	1,661	6	1,667	....	430	2,097
La Plata	44,896	31,418	76,314	73,624	3,202	153,140
Los Animas	517	16	533	....	....	533
Mesa	21	82,058	82,079	....	812	82,891
Montrose	330	57,344	57,674	....	12,352	70,026
Montezuma	15,275	114	15,389	....	....	15,389
Mineral	90,825	4,865,676	4,956,501	253,415	3,526	5,213,442
Ouray	1,674,857	2,994,992	4,669,849	337,104	53,829	5,060,782
Park	151,594	92,325	243,919	24,144	1,375	269,438
Pitkin	51,770	5,322,162	5,373,932	1,136,464	3,369	6,513,765
Pueblo	906	1,624	2,530	461	10	3,001
Rio Grande	19,044	3,349	22,393	73	57	22,523
Routt	11,437	1,390	12,827	151	....	12,978
Saguache	3,659	18,142	21,801	19,690	6,147	47,638
San Juan	990,352	1,529,773	2,520,125	714,809	208,412	3,443,346
San Miguel	1,365,966	1,552,574	2,918,540	175,037	27,980	3,121,557
Summit	258,092	338,997	597,089	179,997	11,407	788,493
Teller	15,658,254	105,551	15,763,805	....	....	15,763,805
Co. unknown	250,828	231,744	482,572	8,381	14,861	505,814
Totals	$26,265,487	$29,679,706	$55,945,193	$6,051,156	$1,975,518	$63,971,867

Commercial value of silver, $13,707,882.

BOULDER COUNTY.

At Boulder the Delano mill resumes work April 10 by the Atlas Reduction Works, C. D. Grove Supt.

CLEAR CREEK COUNTY.

(Special Correspondence). — Samples from a body of ore opened in the Scepter tunnel, on the Astor group, assayed 417 ounces gold, 69 ounces silver, 31% lead. It is claimed the 400-foot tunnel named runs alongside the ore body for 300 feet. The ore streak is about 2 feet wide.

Georgetown, March 26.

EL PASO COUNTY.

The Standard Reduction & Smelting Co. will build its new works in Colorado City. The mill will have a capacity of 400 tons daily.

A new mining exchange building is to be erected at Colorado Springs, Colo., to cost $200,000.

GILPIN COUNTY.

The Gregory, Bob Tail, Cook & Fiske groups, near Central City, are reportcd sold to a French company. There are about forty claims, with a gold-producing record of $14,000,000.

The California mine is being unwatered to the 2250 level, where drifting will be carried on. At the Hidden Treasure a small hoister will be put in the 1400-foot level, to sink a winze from that level to the California 1700 level.

GUNNISON COUNTY.

At Vulcan ore has been struck in the Midland mine—3 feet of high-grade shipping ore.

LAKE COUNTY.

(Special Correspondence).—The Silver Cord M. & L. Co. has been organized by Max Strauss, C. P. Schumacher, W. L. Cooper, J. B. Frank and N. L. Burton, all of Denver, to operate the Silver Cord group on Iron hill, on which the new company has a four-year lease.

Leadville, March 24.

(Special Correspondence).—The Stevens shaft of the Iron Silver M. Co. has been unwatered. A new compressor and pumps will be put in position for work. The shaft is now 550 feet deep, and Mgr. T. E. Schwarz thinks sinking may be resumed.

Leadville, March 26.

Thorough development of the low-grade ore in the Hap Hazard mine is proposed, the idea involving the building of a mill for its treatment.

The Gordon mine at Twin Lakes is sold to Milwaukee men for $50,000.

LARIMER COUNTY.

(Special Correspondence). — The new copper finds in this county are attracting mining men this year. It is claimed by those who have made investigations that a belt, more or less copper mineralized, extends northwesterly from Fort Collins almost to the Wyoming line and has a width of four miles in places. The country rock is granite schist, with porphyry dikes cutting the formation.

Fort Collins, March 24.

MONTROSE COUNTY.

(Special Correspondence).—Uranium has been found on the surface in the northern part of this county. A sample showed 29% of that metal. A shipment of 1400 pounds was made to Denver, returns therefrom amounting to $500 for the uranium in the ore. The deposit is said to be a large one.

Montrose, March 26.

PARK COUNTY.

(Special Correspondence). — A force of twenty men is at work on the Ling mine, near Alma, under the management of F. A. McIntyre of Denver. The ores consist of sulphides, carrying lead, copper and gold. The property is now shipping.

Alma, March 23.

PITKIN COUNTY.

At Aspen it is rumored that the Mollie Gibson is to be unwatered.

SAN JUAN COUNTY.

(Special Correspondence). — Rich gold and silver ore is struck in the Willie lode, on Anvil mountain, near Silverton. The property belongs to Wm. Beilfieldt & Son. The highest values are in white quartz.

Purpus & Williams have a four years' lease of the Red & Bonita mill, near Gladstone, and propose to run on ore from the Tilden and Queen Ann groups.

Silverton, March 24.

SAN MIGUEL COUNTY.

The Butterfly at Ophir is working in good ore and the stamp mill is running to the limit of the water supply.

SUMMIT COUNTY.

(Special Correspondence).—The Breckenridge Deep M. Co. have taken over the group of the New York M. & D. Co. on Shock hill, on which the latter company spent $30,000 in development. The former company is largely made up of local people, whose purpose is to thoroughly prospect the locality by sinking the present 300-foot shaft to greater depth, in the hope of striking the contact ledge known to cut through that section. C. A. Finding is manager of the home company.

Breckenridge, March 23.

(Special Correspondence).—The new 20-stamp mill on the Excelsior mine is operating, crushing sixty tons of ore per day, the product shipped being four cars per week of concentrates. The mill is run by electric power, generated by water power on Ten-mile creek. A. B. Ogden is Mgr.

Frisco, March 26.

TELLER COUNTY.

At Cripple Creek the Doctor mine is reported producing 100 tons a day, which averages $100 per ton, or $10,000 a day, from between the 400 and 600-foot levels.

IDAHO.

ADA COUNTY.

Boise has accepted the proposition of R. J. Anderson, representing the War Eagle Co., to establish a milling and concentrating plant there, if the Boise people raise $10,000, to be loaned to the project, the business to be in the hands of trustees.

LATAH COUNTY.

Thirty men are employed in the Muscovite mica mine, twenty-six miles east of Moscow. Five carloads of block mica are out ready to dress, and seven carloads have been shipped out this season. Two hundred pounds of cut mica were shipped from Vollmer last week.

SHOSHONE COUNTY.

W. E. Seitz is running the Golden Chest mine at Murray and has a controlling interest in the Dora, Katie Burnett, Idaho and Paymaster. It is thought the machinery of the mills must be moved to a better location.

At Wallace the Canyon Creek M. Co. will run its tunnel 100 feet and cut the ledge at a depth of 525 feet below the surface.

MICHIGAN.

The annual report of the Tamarack M. Co. for 1899 shows during the year:

Received from sales of copper	$2,952,098
Total costs	2,211,588
Mining profit	740,510
Dividends	600,000
Surplus	140,510
Tons rock hoisted	775,532
Tons rock stamped	631,090
Cost stamp ton	22.727c

During the year $400,651 was spent for construction and charged directly to operating expenses. Supt. Parnalls' report says: The total shaft sinking amounted to 1065 feet. No. 5 shaft is now down 3918 feet. Drifting on the conglomerate during the year amounted to 1938 feet at No. 2 shaft, and 3357 feet at No. 3 shaft. Drifting on the Osceola amygdaloid amounted to 1888 feet. Crosscutting amounted to 3660 feet. Total work of all kinds, 13,206 feet.

MONTANA.

CASCADE COUNTY.

The concentrator at Neihart will begin April 15. The main motor is a No. 7 Pelton, with two nozzles, capable of generating 450 H. P. This will run all the heavy

machinery in the plant, the power to be conveyed by manila ropes. Three other water motors, each a No. 3, will attend to smaller departments of the work. Two are for the operation of electric dynamos and a third is to run the tables.

GRANITE COUNTY.

F. D. Brown has men at work at the Hidden Treasure mines, Harvey Creek district. A mill will be built this season.

The Masculine, at Garnet, is under lease and bond to Helena men, who will develop it. Machinery will be put on.

The drift from the tunnel on the vein in the Buena Vista is in 3 feet of ore with an average value of $27 gold.

CARBON COUNTY.

Following are the requirements of the Red Lodge Miners Union No. 29, Western Federation of Miners, employes of the Rocky Fork Coal Co.: "We beg leave to make answer to the sweeping reduction of wages by said company, which is to take place on the 15th day of March, 1900, and submit for your consideration the following scale of wages to take effect on and after the 15th day of March, 1900: Whereas, the mining and shearing of coal by the present system of machinery being of no material assistance, but rather a great detriment to the mining of coal in the Rocky Fork coal mines, we demand that the price per ton be as formerly, to wit, 75 cents per ton. Or, if the present system is continued, $3.25 per day for machine runners and helpers, drillers and helpers, blasters and loaders. For the places working on the level, empty pit cars shall be delivered to the working faces and all loads removed therefrom by the company. Timber shall be delivered at the mouth of each room and track shall be laid to the working face, as formerly. All crosscuts in rooms under 6 feet, nothing; from 6 feet to 15 feet, $1.50 per yard; over 15 feet, $2 per yard for the whole crosscut. For turning rooms across the pitch, $15; turning rooms with the pitch, $7.50; No. 2 mine and No. 6, if machinery is used, $3.25 per day, the same as No. 4 mine, or, if under the old system, for all men connected with mining and shearing machinery, 90 cents per ton. Tracklayers shall receive $3 per day; tracklayers' helpers, $2.75 per day; timber men, $3 per day; rope splicers, $3 per day; drivers, $2.35 per day; team drivers, $3 per day; cage men, $2.85 per day; common labor in mines, $2.75 per day; all outside labor not less than $2.50 per day."

MADISON COUNTY.

The smelter at Twin Bridges is shut down to put in an electric plant. Mgr. Owsley says: "We are going to do business right or go broke."

SILVER BOW COUNTY.

The Anaconda Standard reports the sale of the Speculator mine to the Amalgamated Co. for $2,000,000. It has been clearing over $50,000 per month and there is considerable ore in sight. The Speculator has always been a steady producer. Although the product is mostly copper, the first-class ores run ten ounces of silver to the ton and carry a percentage of gold, which appreciably affects the total value. The first-class ore is sent to the Deadwood smelter, where it is treated by the Golden Reward Co.; the second-class by the local smelter. Much of it is sold directly to the reduction works. Over $100,000 has been spent in the past four months improving the plant. W. W. Wishon is Supt.; P. Sheean foreman.

TETON COUNTY.

The A. M. Esler M. & C. Co. will this spring build a concentrating mill, 100 tons daily capacity, in Swift Current mining district, under a contract to concentrate 400,000 tons of copper ore for $6 per ton.

NEVADA.

ELKO COUNTY.

It is stated that the expenses of the Dexter mine at Tuscarora for February footed up $13,000, and that the amount realized from the bullion output for that month was $7,600. The manager of the mine attributes the large expenses to dead work that had to be done, and says that after April 1 there will be a profit.

ESMERALDA COUNTY.

The Northern Belle Recovery Co. has been formed to work the tailings of the Holmes M. Co. at Belleville; capital, $500,000; directors for the first year, M. L. Elliott and M. L. McDonald, Santa Rosa, Cal.; W. Irelan Jr., A. H. Barendt, San Francisco; I. Blake, New York.

LINCOLN COUNTY.

(Special Correspondence).—Proceeding from Deer Lodge to Panaca, we pass down Spring Valley creek, through Round ranch, Conder canyon, and into the north end of Meadow valley, where the latter town is located. On reaching Spring valley we strike the grade of the old Pioche Railroad, which operated during the '70s between the mines at Pioche and the mills at Bullionville, a distance of about twenty-five miles. Relics of numerous mills are to be seen along the creek, which are pointed out as memories of better days. Near the head of Conder canyon a dam has been thrown across the channel, impounding a good-sized reservoir of water above it, used for irrigation purposes in the valley around Panaca. In passing through the valley named one is compelled to gaze in wonder at the diverse and remarkable formations exposed. The ledges of granite, porphyry, white sandstone, lime and chalk rock, in many places stained with green copper carbonates and in others with a red iron oxide, form features of unusual interest.

At Bullionville are thousands of tons of mill tailings, reputed to contain good values in silver and lead. At this point the Peck concentrator, rebuilt two years ago from some of the old mills at a cost of about $50,000, ran thirty days last year on these tailings, but apparently with poor success, as it has since been closed down, though it is in good repair and is kept in charge of a watchman. WASCOTT.

Panaca, March 7.

The 5-stamp mill and concentrating plant of the Dividend Co. at Como has started.

STOREY COUNTY.

The Comstock Pumping Association will pay the Risdon Iron & Locomotive Works of San Francisco the remaining installment of $5000 on the contract to drain the Comstock mines, the Risdon people having demonstrated that the water in the C. & C. shaft could be lowered with the hydraulic elevators the full 500 feet called for by the contract, provided that 200 miners' inches of pressure water could be furnished. The Virginia & Gold Hill Water Co. has notified the Pumping Association that it will be unable to supply as much as 200 miners' inches of pressure hereafter. The Risdon Co. will furnish throatpieces and nozzles for the elevators free of charge for one year, and subsequent drainage operations with these elevators will be conducted solely by the Comstock Pumping Association.

OREGON.

BAKER COUNTY.

Three miles from Granite, W. J. Larkins, Supt. Conger mine, has spent $100,000 in plant and development and expects to spend $50,000 more this summer. He has considerable good ore which is worked by the cyanide process.

During February at Sumpter 15,050 tons of ore were milled, of the aggregate value of $196,000; 166 stamps at ten mines were at work; 160 stamps and one 250-ton cyanide plant were idle. The total output does not include ore shipped by the Golconda to the Selby smelter at San Francisco or the returns from concentrates shipped by the Bonanza, Golconda, Columbia and Badger mines.

The Gold Hill mine, Weatherby district, will increase the capacity of the mill from five to twenty stamps.

LANE COUNTY.

The Bohemia Girl mining claim, Bohemia district, is sold by Hinds & Londstrom to Seattle men.

UTAH.

MORGAN COUNTY.

At Carbonate Hill the Mountain Laurel M. Co. has incorporated and will develop their property. J. S. Lewis, Ogden, is secretary.

TOOELE COUNTY.

Tribune: In a decision by Judge Cherry that court takes the position that the owner of a claim can make a discovery and location within the boundaries of a former location. The ruling was handed down in three cases that were recently tried in Tooele county, in which the Bunker Hill M. Co. at Stockton and F. J. P. Pascoe, W. Reynolds and J. Brande were defendants. The latter had applied for patents on the Ada and Ada No. 2, which had been located within the lines and boundaries of the Chief—which latter was an original location made by the defendants — whereupon the Bunker Hill Co. adversed them on the ground that the Ada locations were irregular. The decision is an instructive one, and the first ruling of the kind of which any knowledge is had locally.

UINTAH COUNTY.

At Vernal the Uintah Copper & Gold M. Co. has incorporated to work some claims in Red Creek canyon, ten miles west of the Jessie Ewing mines. The ore shows 3% copper, with small values in gold and silver. The formation consists of mica, schist, quartz and porphyry.

WASHINGTON.

FERRY COUNTY.

(Special Correspondence).—The Mountain Lion mill started dropping its twenty stamps on the 15th inst.; the first cleanup will occur April 5th. This mine, two miles north of the town of Republic, has three distinct veins, two of which have been explored. These two show a large amount of quartz of medium grade in gold values. One ledge—average width 10 feet, average value $15—has been developed by a drift at a depth of 300 feet. The main ledge at that depth has been exposed by a 400-foot drift, 10 feet wide, which, with the crosscuts run, show the ledge to be from 9 to 26 feet in width, with an average value of four ounces of silver and one of gold. A winze has been sunk to, and a double-compartment shaft raised from, the 425-foot level, and a small amount of drifting done on this level. The quartz is a pure milky white, very hard and brittle, and shows a banded or ribbon appearance, especially in the pay chute, where the quartz is full of dark-banded ribbons. The gold occurs more free and less finely divided than in the Republic and other mines a mile or two to the south, and in the new mill the process adopted is entirely different from any yet tried in this locality. Mgr. J. S. Wyatt expects to make a saving of 90% at an expense of $3.50 to $4 per ton mining and milling, as the ore bodies are large and the mill is as near automatic in all operations as is possible to make it. The treatment is a combination of amalgamation and cyaniding, both by agitation and percolation. The ore is raised through the double-compartment shaft by a 75 H. P. electric hoist, where it is dumped into an automatically operated tramway, which conveys it to the mill building below, 106x185 feet. Here it is received in a 500-ton bin, and from there the coarse goes to a 9x15 crusher, and thence, together with the fines, to a 200-ton bin; from this it is automatically fed to twenty 1200-pound stamps, which crush it to 30-mesh, and then, after passing over copper plates, it goes to four 5-foot Huntington mills, which crush to 60-mesh. After leaving the Huntingtons it is agitated for seven hours in 30-ton tanks, and then passes to eight percolation tanks, 24 feet in diameter and 6 feet deep, where it will remain from twenty-four to seventy-two hours, depending on the ore. Thence the solution is passed through the zinc boxes and the cyanide solution pumped back to a storage solution tank to be restandardized and reused.

Three properties of Republic Camp—the Golden Lion, Little 4 and Stray Horse—have entered into a contract with Keoh & Stone for several thousand feet of work in the way of diamond-drill prospecting. Results in this camp are considered questionable.

The largest deal ever closed on a property on the South Half of the reservation, if not in this State, was made yesterday when P. Clark of Spokane bonded from the Farr Bros. the Manila claim, lying about four miles west of the camp of Keller, for $200,000. It is a fine copper showing. A 70-foot tunnel at a depth of 50 feet shows a 40-foot ledge of copper-silver ore of a concentrating character, assaying from 3% to 10% and 20% in copper and concentrating as high as 8 to 1, with about three ounces of silver accompanying each per cent in copper. There is every indication of some stir on the South Half this coming summer, as Clark has the reputation of not taking a bond on a property unless it has good indications of making a dividend-paying mine, and his success with the Republic of this camp and War Eagle of Rossland has given him a strong following.

Republic, March 17.

SNOHOMISH COUNTY.

The Everett smelter will add an arsenic plant. Under the present system the arsenic passes out of the smelter smokestack. As soon as ore can be had from the mines at Monte Cristo the smelter will be run at full capacity.

FOREIGN.

MEXICO.

The new cyanide plant of the Minas Prietas Reduction London corporation at La Colorada, State of Sonora, will be in operation next month.

The Minas Prietas M. Co. owns a railway from Torres, 103 kilometers from Guaymas, on the London Railway, to their mines, twenty-five kilometers distant, which is in operation. The company holds a concession from the Mexican government to continue the railway 100 kilometers beyond their Minas Prietas mines to tap other mining districts and towns. By the terms of this concession the company is obliged to begin construction on this extension before June 10, 1900.

Two Republics: Six mining engineers, accompanied by Angel Caso, started for Toluca on Tuesday by the National, on their way to Zacualpam, to examine a mining combination consisting of the Alacran, Socavon de San Fernando and Providencia mines. These engineers represent a strong London syndicate, which is prepared to pay $4,000,000, Mexican currency, for the property if their report is favorable. The party came out from London expressly to examine these mines, which were extensively worked by the old Spaniards in the colonial days and have yielded millions of dollars. A memorandum of contract as to the conditions of the purchase was drawn up and signed before a notary in this city and a deposit on account has been placed in the Bank of London & Mexico.

RUSSIA.

Circulars distributed all over the Pacific coast convey the implication that American miners can go prospecting in Siberia. Transportation companies use specious means of working up business. It is well for miners everywhere to understand that, unless by special permission, they are not allowed to go to Siberia to mine. The following is official:

CONSULATE OF THE UNITED STATES OF AMERICA,
ST. PETERSBURG, Feb. 13, 1900.

SIR:—Your favor of January 15th is at hand. The order prohibiting foreigners to mine on the west coast of Siberia is still in force, and a special permit can only be had by some one with a strong personal influence with the Emperor, on whose special order they are issued. I send you under separate cover, registered, a French copy of the Russian mining laws. Very respectfully,

W. R. HOLLOWAY,
Consul General.

IMPERIAL RUSSIAN CONSULATE,
SAN FRANCISCO, CAL.,
March 16, 1900—No. 104.

In reply to your letter of March 13th, I will inform you that foreigners are disbarred by law from prospecting and mining on the Siberian coast and the island of Saghalien, except by special permission of the Ministers of Agriculture and of the Interior, obtained through the Governor-General of the Amour Territory. Faithfully yours, ARTZIMOVITCH,
His Imperial Russian Majesty's Consul.

SOUTH AFRICA.

Discussing the effect of the Boer war on Transvaal gold mining, the London Statist thinks that the industry will have to contribute the cost of interest and sinking fund on the part of the war expenses, provide for an armed force to keep order, and help compensate those whose property has been damaged. On the other hand, there will be removed an oppressive government to whose extravagance it has contributed an amount equal to 3% interest and 1% sinking fund charges on $200,000,000. The Transvaal government expenditure rose from $6,510,000 in 1893 to $18,510,000 in 1896–98, the increase being spent for armament. Huge reductions could be effected with the disappearance of the dynamite and kindred monopolies, lowering of railway rates and the influx of new capital under conditions of security. Under an efficient government the mining companies could save $1.25 per ton milled, or, on 8,000,000 tons a year, $10,000,000. In government administration there is possibly a saving of $8,000,000. Setting against these amounts the cost of military police and the interest and sinking fund of a loan above referred to, the net gain for the industry under new conditions should be $5,000,000 a year. A result of British supremacy would be for the mines a great widening of the area of the industry and a development of low-grade mines which it was formerly thought unprofitable to exploit.

Commercial Paragraphs.

AT Sutter Creek, Cal., Knight & Co. are building a hoist for the Baliol mine, which was recently sold to a German company.

THE Risdon Iron Works of San Francisco is to establish a large shipbuilding works. The company takes the plant and site of the Pacific Rolling Mills Co., giving 1500 feet of water front and thirty-two acres of ground. The new plant will include a large drydock.

A NEW hammer-sling device, invented by H. Schepers, for relieving the strain on arm and wrist in single-hand drilling, is placed on the market by the Rix Engineering & Supply Co., 519 Howard St., San Francisco. Letters from miners who have used it testify to its merit.

THE Jeanesville Iron Works Co., Denver branch, A. Middlebrook Mgr., report recent shipments to iron and silver mines, Leadville, of high-lift station pump; Congress gold mine, Congress, Arizona, mine station pump; Battle Lake, Wyoming, No. 6 sinker; Mexico, two 4″x8″ electric power sinking pumps. The Jeanesville office has a wire order from Mexico for one 5½″x8″ electric sinker.

Personal.

CHAS. HUMMIELL, of Chicago, says he has $50,000 to spend at Cape Nome in securing unoccupied ground.

G. M. HYAMS succeeds Marcus Daly in the management of the Anaconda and other Butte, Mont., properties.

R. H. POSTLETHWAITE AND A. E. C. KERR, the latter from Ballarat, Australia, are visiting the Oroville, Cal., gold dredgers.

S. T. MURCHIE of Nevada City, Cal., goes as Supt. Taylor mine, Gunnison county, Colorado. His son will be foreman of the mine.

BEN AND LEWIS WILLIAMS, formerly of Arizona, are in receipt in San Francisco, of a $700 cup given them by former associates in the Copper Queen mine.

W. S. KEYES, now at Butte, Mont., has been appointed delegate to represent the United States in Paris at the International Congress of Mines and Metallurgy, July, 1900.

THE Merchants' & Manufacturers' Association of Los Angeles, Cal., has appointed C. B. Boothe as their representative at the coming Transmississippi Congress, to meet at Houston, Texas, Tuesday, April 17, continuing five days.

J. B. GRANT, of the American Smelting & Refining Co., is at Durango, Colo., to take possession of the Standard Smelting Co., which has been bought by the trust. It may be operated as a roaster auxiliary to the La Plata, Colorado, plant.

PROF. JOSEPH LE CONTE is the accredited representative of the University of California at the International Congress of Geologists in Paris next September, Prof. Stringham at the Congress of Mathematicians and Prof. W. B. Rising at the Congress of Applied Chemistry. Prof. Rising will be a member of the international jury of awards.

Obituary.

JNO. G. MURPHY, of Denver, inventor of the Murphy process for the reduction of ore, died in New York City on the 21st inst., aged 48 years.

H. J. DE LAMER, a prominent Arizona miner and late manager Temple Bar placer mines on the lower Colorado river, died in San Francisco on the 22nd inst.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING MARCH 20, 1900.

645,918.—MEASURING INSTRUMENT—J. G. Hanks, Oakland, Cal.
645,901.—TRUSS—P. Madden, Soldiers' Home, Cal.
645,669.—LAMP CHIMNEY—J. F. McHenry, Hollister, Cal.
645,825.—VEHICLES—J. Nash, Dayton, Cal.
645,631.—FIRE ESCAPE—C. H. Shields, Spokane, Wash.
645,904.—CULTIVATOR—I. D. Stockton, Penrose, Cal.
645,841.—WASHING MACHINE—C. W. Thompson, Ontario, Cal.
32,360.—DESIGN—C. E. Pierce, Avon, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BORING DRILLS.—C. S. Stafford, San Francisco, Cal. No. 645,219. Dated March 13, 1900. This invention relates to boring and drilling devices. It consists of a stop, a drill spindle turnable therein, and mechanism by which it is rotated, a sleeve forming the lower end of the stop, and an internally threaded collar loosely turnable within the sleeve having its inner end formed with an exterior annular groove, and its lower end provided with an antifriction bearing for the sleeve. A screw or pin passes through the inner end of the sleeve and engages the annular groove in the collar to prevent end movement thereof. A brake piece is loosely seated in the sleeve and a screw for operating the same. A yoke is carried on the outer end of the sleeve below a brake screw, and a device is carried by the yoke to engage the work to be drilled. The operative devices consist of a beveled gear journaled and turnable upon the side of the stop, having outer and inner teeth, corresponding bevel pinions loosely turnable upon the ends of the sleeve, with lugs upon their adjacent faces, a two-part sliding collar loosely fitting the sleeve between the pinions having slots in its outer ends to engage either of the lugs upon the pinions whereby a varying rate of rotation of the drill will be produced.

WATER WHEEL.—S. J. Tutthill, assignor to Tutthill Water Wheel Company, of San Francisco, Cal. No. 645,221. Dated March 13, 1900. This invention relates to improvements in water wheels of that class in which buckets are disposed around the periphery and adapted to receive water delivered into them by a nozzle under a high head or pressure. In this class of wheels it has been customary to bolt the buckets separately upon the rim, but the gravel or gritty material in the water soon wears the buckets out and cuts off the nuts or bolts by which they are secured. In this invention a plurality of buckets are cast upon segments which are removably fitted to the periphery of the wheel or disk and the ends of the segments abut so as to make practically a continuous plate on each side, thus distributing the strain upon the securing bolts, and these bolts are covered and protected from the impact of the water. The hub of the wheel is also extended so that it covers and protects that portion of the shaft upon each side of the wheel which is in line with and liable to be acted upon by the jet of water from the nozzle. These parts are all formed in a plurality of sections so that any part may be removed and another substituted without destroying the whole structure.

Recently Declared Mining Dividends.

Dixie, Utah, 1 cent per share, $5000	April	1
Centennial–Eureka, Utah, $1 per share, $100,000	April	10
Plumbago M. Co., California, 6 cents per share, $11,400	April	5
New Idria Quicksilver Co., California, 10 cents per share and 10 cents per share extra	April	2
Napa Quicksilver Co., California, 10 cents per share and 10 cents per share extra	April	2
Ætna Quicksilver Co., California, 10 cents per share and 5 cents per share extra	April	2
Cripple Creek Con., Colorado, 8%, $160,000	March	24
Boston & Colorado Smelting Co., Colorado, quarterly dividend of 1½%	April	2

Catalogues Received.

Triple-discharge two and three-stamp mills, and the "Hula Hula" rocker are described and illustrated in the latest leaflets issued by the Parke & Lacy Co., 21-23 Fremont St., San Francisco.

In black and gold comes a 178-page catalogue from C. O. Bartlett & Co., 43-45 Center St., Cleveland, O., general furnishers of elevating, conveying and mining machinery, fully illustrating and describing their specialties. The volume will be sent anywhere, upon request.

Latest Market Reports.

SAN FRANCISCO, March 29, 1900.

SILVER—Per oz., Troy: London, 27⅜d (standard ounce, 925 fine); New York, bar silver, 59½c (1000 fine); San Francisco, 59½c; Mexican dollars, 48¾c.

COPPER.—New York: Lake, 1 to 3 casks, 16.75 cash; carload lots, 16.25; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.25; Casting, 1 to 3 casks, 16.50; carload lots, 16.25. San Francisco: 17½@18. Mill copper plates, 21½c; bars, 23½@25c.

LEAD.—New York, $4.72½; St. Louis, $4.72; San Francisco, $4.85; pipe 7½, sheet 8¾, bar 6½c. London, Soft Spanish Lead, £16 11s 6d.

SPELTER.—New York, $4.55; St. Louis, $4.55; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY.—New York, 9½c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.—San Francisco, No. 1, 10c.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 50@55c ℔ lb.

SOLDER.—Half-and-half, 100-lb. lots, 21½c; San Francisco, Plumbers', 100-lb. lots, 18½c.

IRON.—Pittsburg, American soft—pig—large lots—$25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c.

The New York Commercial foresees a big break in iron prices and says: "Iron and steel prices, so long upheld by a big combination in this market, are on the verge of collapse, according to buyers of such prominence that their statements can not be ignored. A serious bear movement began quietly last Wednesday, gaining emphasis and insistence, and now some of the most prominent metal men in New York give credence to the Commercial's statement over their signatures. Many leaders in the movement for railroad and structural metal at cheaper prices admitted the bear combination, but preferred to let the other side do the talking. It is believed many of them have already received overtures for future delivery under market rates. On the other hand, steel and iron sellers meet the bear talk over their signatures to the Commercial. The president of the Federal Steel Co., Judge Gary, is quoted: 'I say that there is no possibility of the price growing less for the coming year.' Steel and iron producers lay a high price for finished material to an alleged basic price of $5.50 per ton for iron ore contracts up to July 1, 1901. This figure, they claim, is $3.15 higher than the cost of the same raw material one year ago. Continuing, the bulls point to $2 a ton more for coke, 45 cents a ton more for transportation of Lake Superior ore, a 35% to 40% higher rate of wages and a 50% to 100% increase in the cost of rolling stock. Buyers laugh at these allegations. They claim knowledge of a recent sudden increase in the private contracts at cut rates here and abroad."

STEEL.—San Francisco, bar, 12c to 20c per lb.

QUICKSILVER.—New York, $51.25; London, £9 14s; San Francisco, local, $51.50 ℔ flask of 76½ lbs.; export, $47.50.

PLATINUM.—San Francisco, crude, $16 ℔ oz.; manufactured, $19.50@22.00

FERRO-TUNGSTEN.—New York, 60c; San Francisco, 75c (60%).

MAGNESIUM.—New York, $3.50 ℔ lb.; San Francisco, $4.50.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

TIN.—New York, pig, $32; San Francisco, ton lots, 1000 lbs., 34c; 500 lbs., 35c; less, 36c; bar tin, ℔ lb, 40c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 40c to 50c.

NICKEL.—New York, 40@45c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.80 50-lb lots; San Francisco, $2.50 to $3 lb lots.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ℔ set; 14 oz., 40s., 11c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 33@35c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, 1¾c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs, $10.05; Colorado Anthracite, $14.50.

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

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ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

EFFECTING ECONOMY IN
Steam and Power Plants
IS MY BUSINESS.
DOES IT INTEREST YOU?
Howard H. Fielding,
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San Francisco Stock Board Sales.

SAN FRANCISCO, March 29, 1900.

9:30 A. M. SESSION.

300 Belcher 32c	50 Confidence..85c
300 Alta 06c	600 G. & C.....22c
200 B. & B.....35c	300 Mexican.....26c
200 Caledonia...81c	200 Savage.....15c
100 C. C.& V..$1 55	

2:30 P. M. SESSION.

100 Ophir 80c	100 Belcher.....32c
100 G. & C.....21c	100 Utah.....10c
140 C. C. & V.$1 55	400 Overman....19c
100 Chollar 18c	100 Caledonia....85c
105 Y Jacket....15c	50 Standard..$3 05

SITUATIONS WANTED.

Wanted—A Position as Superintendent in a hydraulic mine by a miner who has had twenty years' experience. Best of references as to ability, honesty and sobriety. Address S. O. G., care of Mining and Scientific Press.

Mining and Metallurgical ENGINEER
DESIRES POSITION.
Had long experiences in gold and silver mines and reduction plants. Had charge of stamp mills and cyanide plants. Can furnish best of references. Address CYANIDE, care this office.

WANTED.

A competent and experienced Hydraulic Engineer capable of taking full charge of an extensive piece of work. Answer: Wrenn, California Hotel, S. F.

Wanted—Gasoline Engineer,
One who is a machinist preferred. Applicants state references and salary expected. Address M. M., care of this journal.

WANTED TO BUY,
Two or Three Saddle Tank Locomotives, 36-Inch Gauge, Porter or Baldwin Make Preferred. Must be in good condition. TORBERT & PECKHAM, Monadnock Block, Chicago.

WANTED.—A Second-Hand White Howell Roaster, also a Revolving Drier.
Must be in good repair. Address ARTHUR HENDEY, Agent, Copper Chief Mining Company, Jerome, Arizona.

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Very compact when knocked down for shipment.
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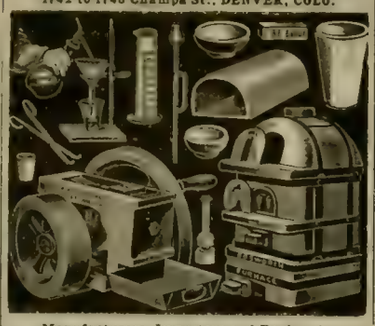
THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from George H. Hedrick, in the Hedrick Gravel Mine, near San Andreas, Calaveras Co., to deposit tailings on a flat below the mine; from Wm. Weyman, in the Weyman Placer Mine, near Placerville, El Dorado Co., to deposit tailings in a reservoir below the mine; from Hugh H. Crain, in the Pigeon Creek Mine, near Plymouth, Amador Co., to deposit tailings in Indian Creek; from Henry Meyer, in the Greenhorn Mine, at Cherokee, Nevada Co., to deposit tailings in Shady Creek; and from the Emery Gold Mining Company, in the Emery Hydraulic Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in Adobe Gulch, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on April 2, 1900, at 1:30 P. M.



DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F.

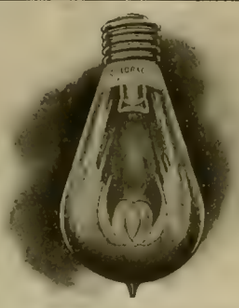
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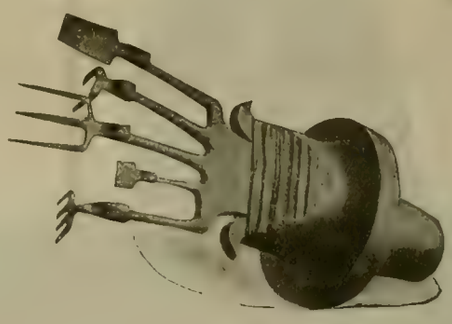
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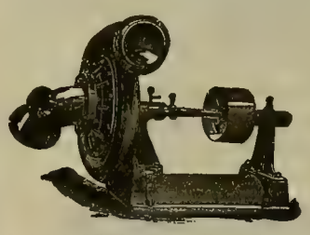
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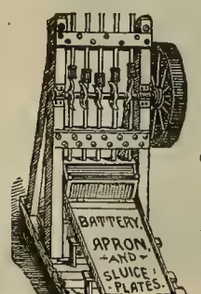
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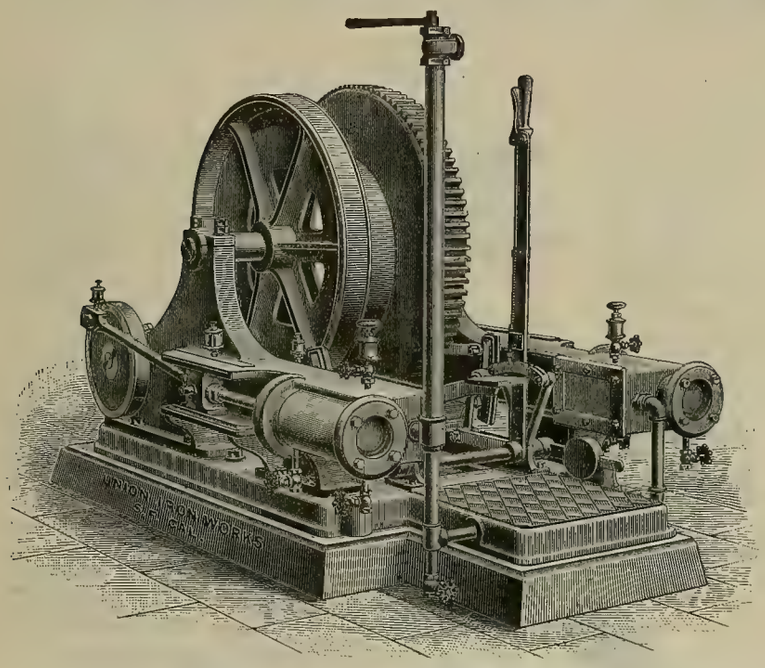
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The entire hoist is self-contained, being mounted on an iron sole plate or bed which carries all the operating levers and provides a footboard for the operator. The engines are provided with reversible link motion and the drum with a broad strap brake, insuring safe and rapid work.

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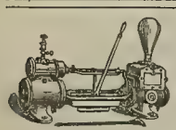
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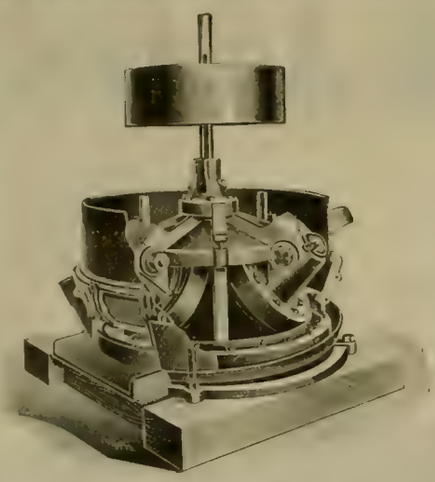
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The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

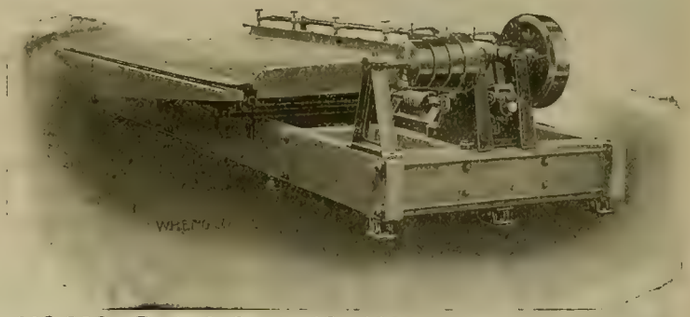
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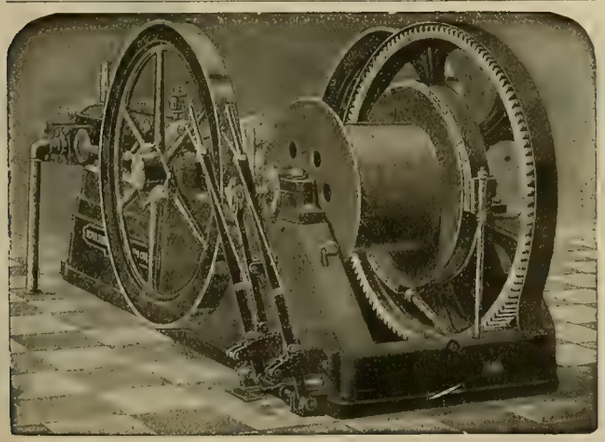
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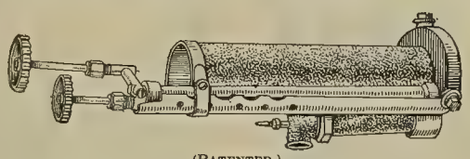
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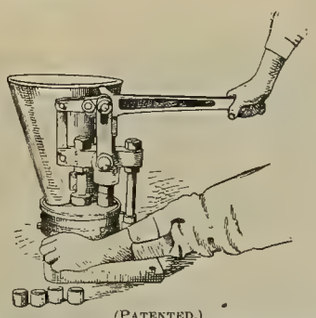
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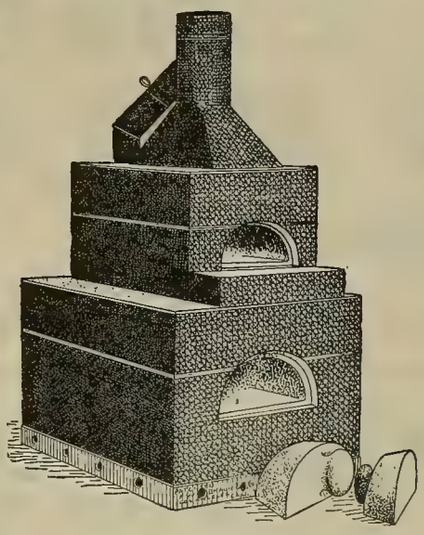
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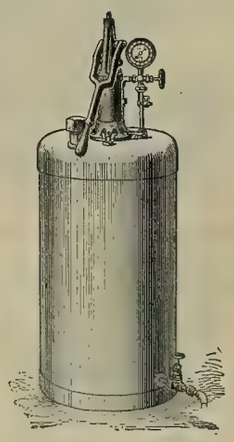
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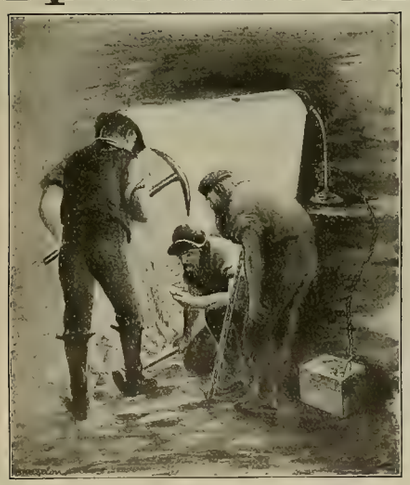
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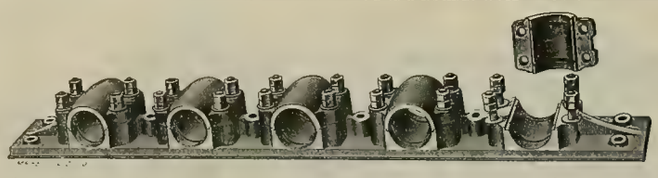
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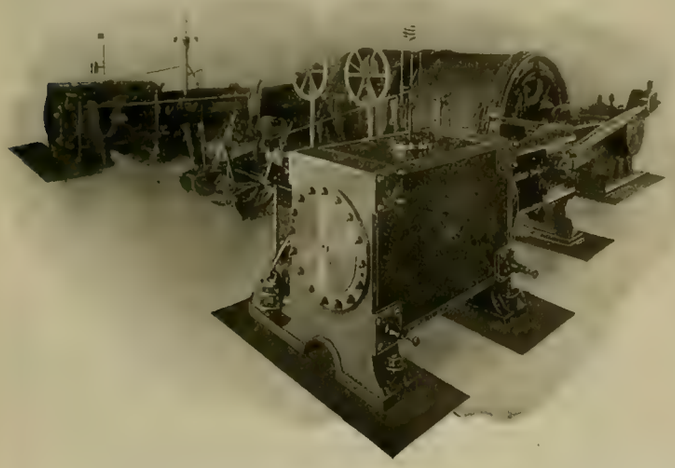
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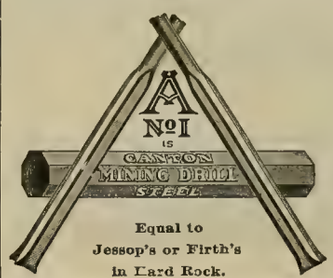
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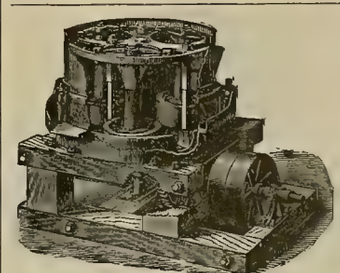
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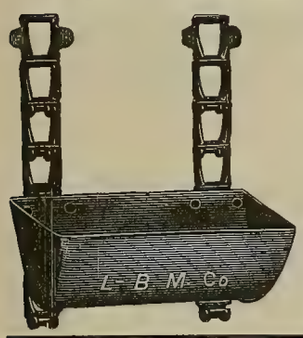


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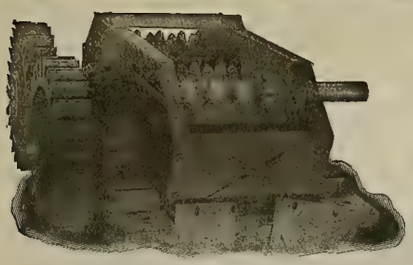
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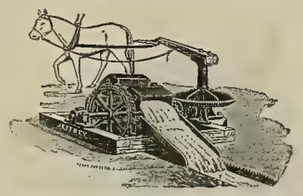


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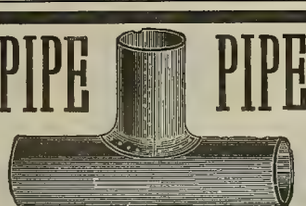


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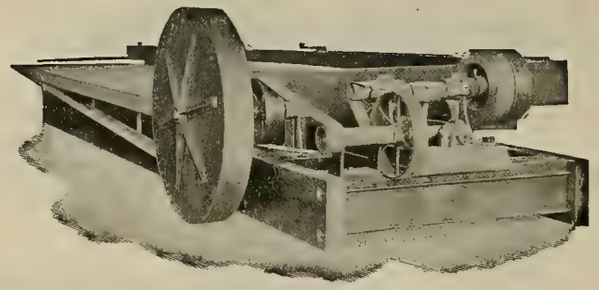
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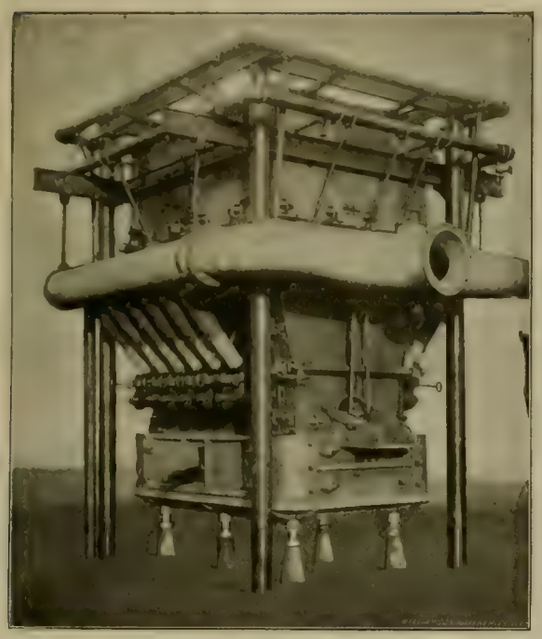
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(SEE PAGE 364.)

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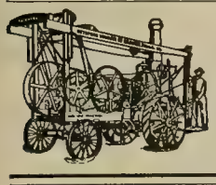
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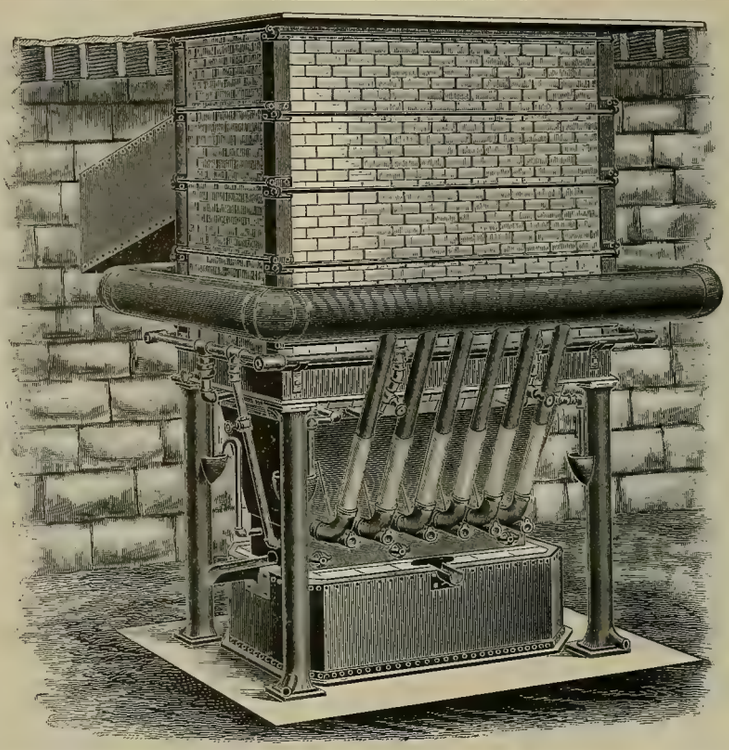
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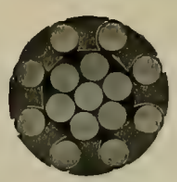
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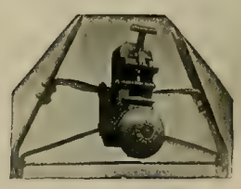
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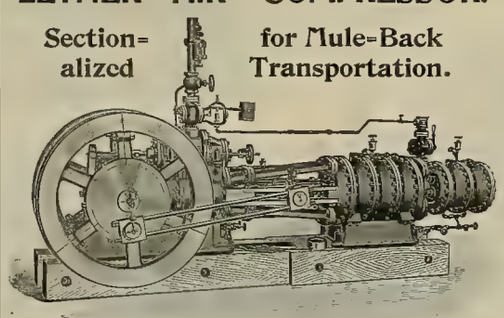
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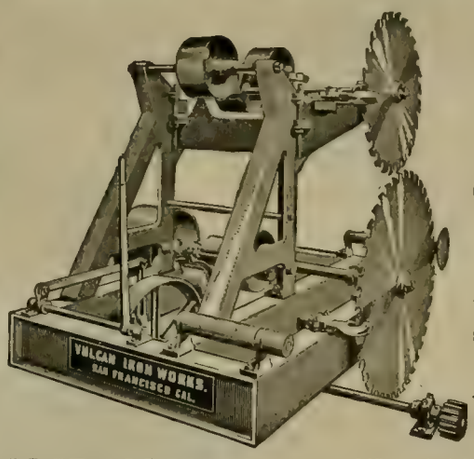
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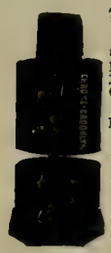
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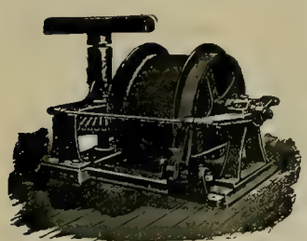
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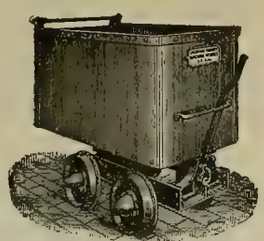
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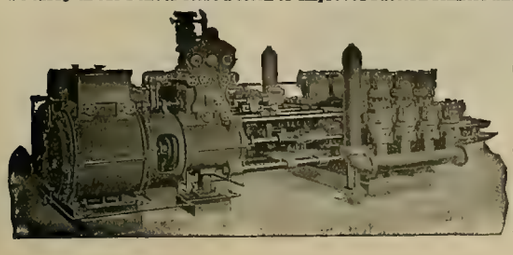
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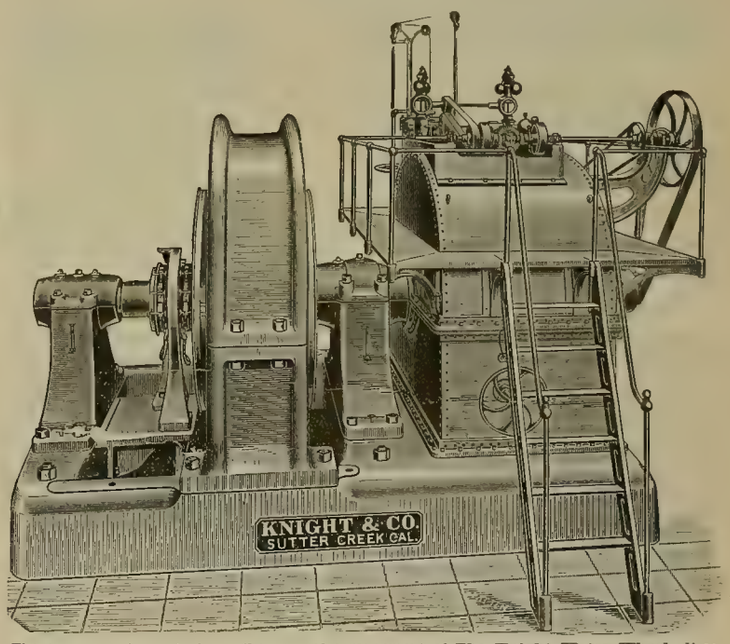
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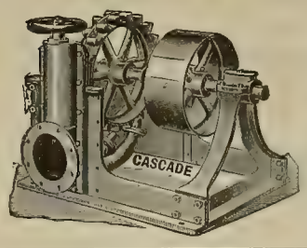
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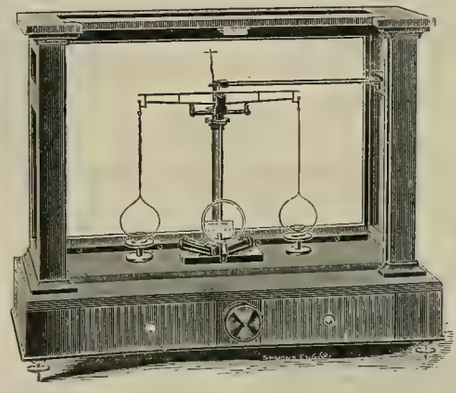


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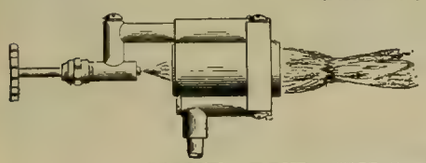
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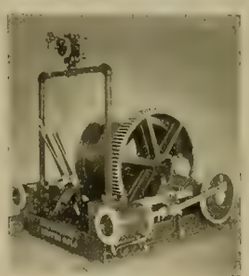
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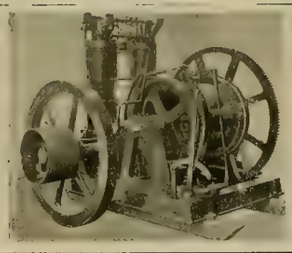
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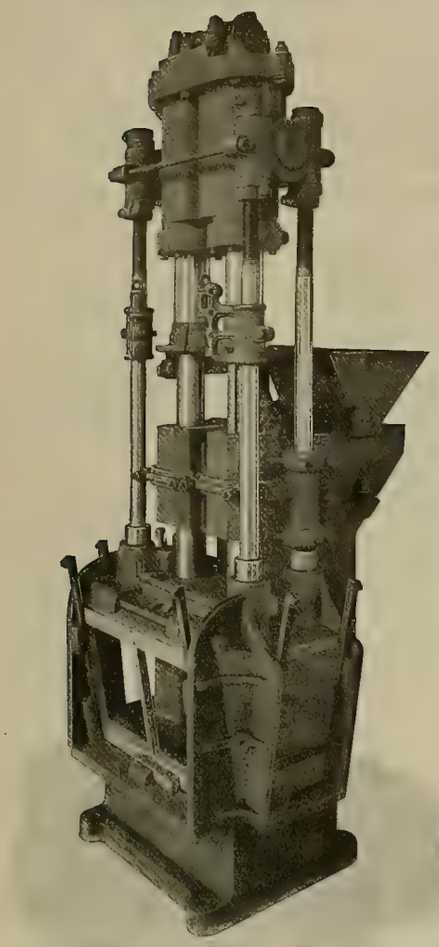
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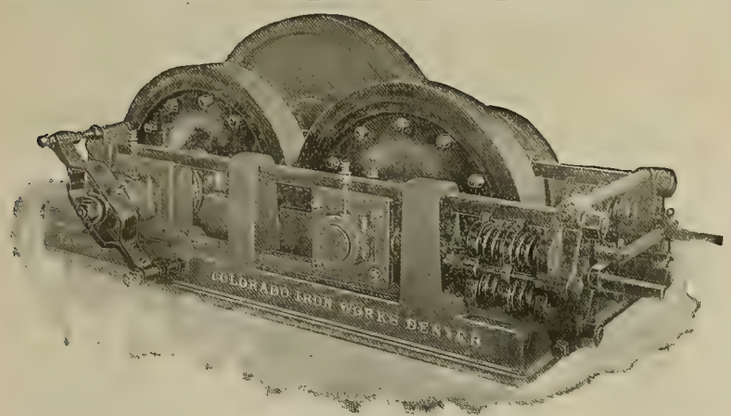
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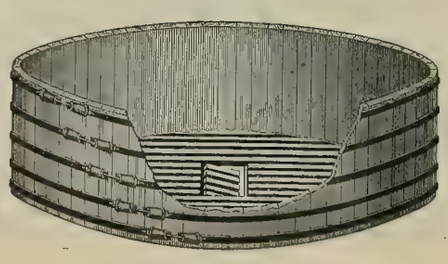
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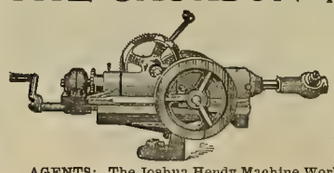
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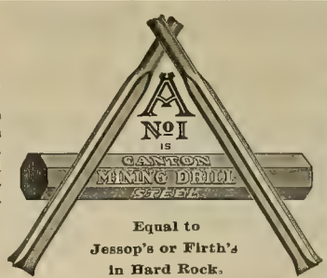
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Any stock upon which this assessment shall remain unpaid on the 1st day of May, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 26th day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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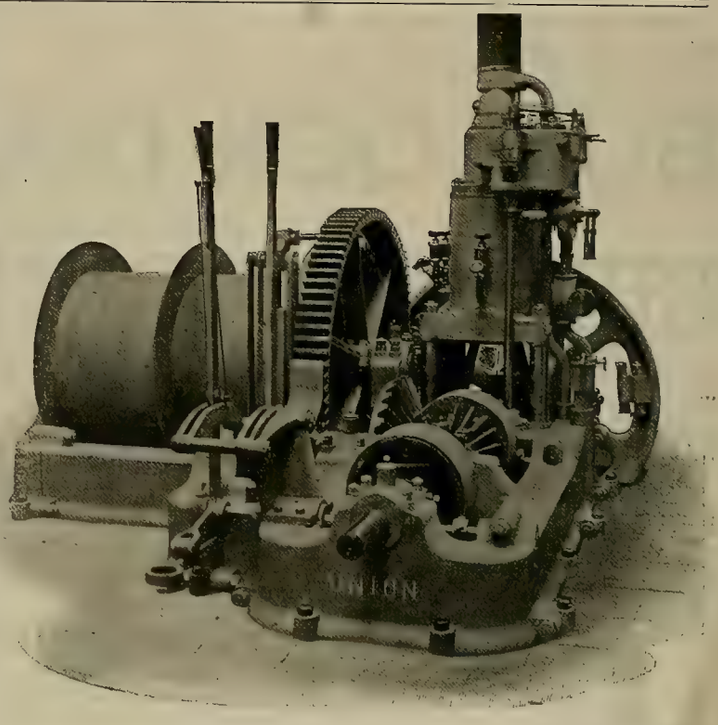
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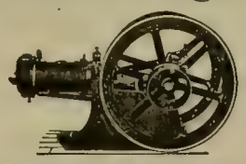
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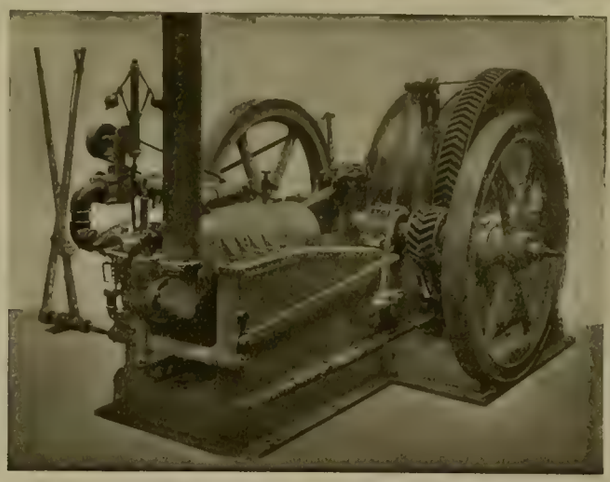
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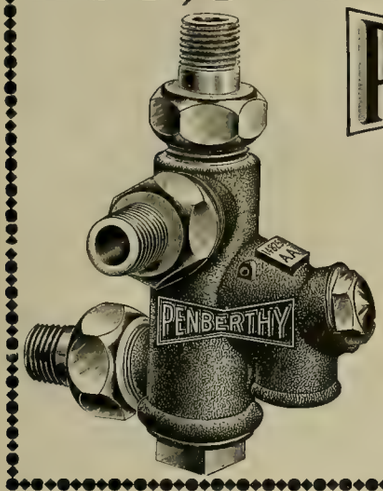
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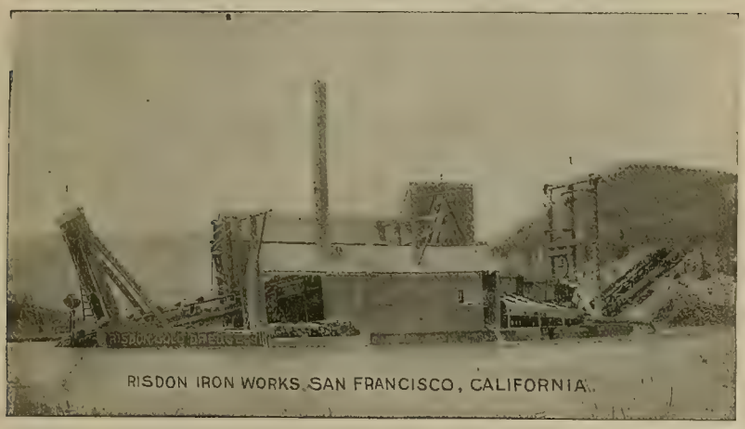
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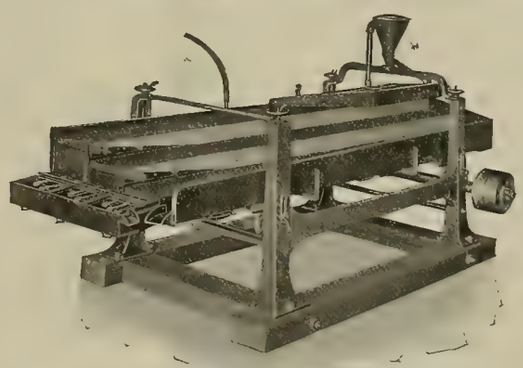
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The Machine is especially adapted to the separation of Zinc and Lead.

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Parties desiring tests made can send 500 lbs. or more, charges prepaid, and a run will be made and reports forwarded of the results, free of all charges, except for the assays, which will not exceed $10.00.

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No. 2072.— VOLUME LXXX. Number 14. SAN FRANCISCO, SATURDAY, APRIL 7, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Nome Gold Separator.

The "Cyclone" gold separator and amalgamator, built by Wm. H. Birch, 129 First St., San Francisco, Cal., and illustrated herewith, consists of an outside cone of copper, spun with corrugations about ¼-inch deep. In the bottom of this cone is screwed an inlet or suction pipe, the diameter of which is regulated to the capacity of the machine. This pipe extends into the cone from 1½ to 4 inches, leaving a space around it for quicksilver and the clean-up. On the lower end of this suction pipe there is a metal coil to prevent the entry of any rock too large to pass through the machine. There is also an inside cone with two large outlets, either of which equal the diameter of the suction pipe. The rod to which the handle and gearing for working the machine is attached is screwed into the center of the inner cone. This cone has small lugs which slip under ear pieces attached to the outside cone, and thus, by the use of a small screw, the two cones are tightly locked together. Attached to each outlet of the inside cone is a grizzly, through which the finer material passes immediately on entering the machine from the suction pipe. The coarser particles that will not go through the grizzlies are carried up past them, and, like the finer parts, are forced by centrifugal action around the inside of the outer cone. By the time the material has traveled from the bottom to the top of the cones, the heavier particles, such as gold and other precious metals, are separated from the gravel and sand, the latter passing out at the top, the former remaining in the bottom of the outer cone around the suction pipe. By turning the handle which works the gearing, both cones revolve under water. The inside cone is supplied with a number of fans, which form compartments and separate the two cones. The water filling these compartments, and the action caused by turning the cones around by the aid of the gearing, causes a reversed whirlpool or suction, and by this method any material of the proper size that may come in contact with the suction pipe under water will be taken up and into the machine. The machine, with metal tubing enough to work in 6 feet of water, weighs thirty-five pounds; additional tubing weighs 1½ pounds per foot. Should the tank system of working be adopted, the entire outfit would weigh about 250 pounds. The manufacturers claim as an important feature of this device that, no matter what climate it may be used in, it can be worked throughout the entire year.



Works of the Champion Mining Company, Near Nevada City, California. (See page 377.)





Nome Gold Separator.

When the present oil excitement began this paper published two series of articles on oil formations, and oil lands in general, giving full up-to-date information concerning the California petroleum industry. The question of petroleum miner's rights, "scrip," and other matters now comes up, and, in accordance with its custom of supplying accurate information on such subjects, is begun in this issue an exposition of law and fact in such cases as now interest so many thousands of people. The article on page 373 is not an ex-parte statement, but is an impartial explanation of the question, clearly setting out present conditions and suggesting intelligent remedy for existing defects in mining procedure.



Mammoth and Mountain View Antimony Mines, Seven Miles From Austin, Nevada, Altitude 9000 Feet. (See page 376.)

MINING AND SCIENTIFIC PRESS.

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San Francisco, April 7, 1900.

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A Difference in Methods.

In our special correspondence this week some Nevada county, Cal., mines are mentioned that practically and specifically illustrate one phase of California gold mining, viz., that they "go down." Mines that were once "abandoned"—that is, unworked because of lack of profitable processes for the sulphureted ore that came in as depth was reached—are regular dividend-paying properties, workings extending in some instances to a depth of 2400 feet. With greater understanding of these facts the traveler along the axial mountain line of California should not be out of the thunder of dropping stamps from San Diego to Siskiyou, the entire 700 miles of the State's length. Many of these old mines, long idle, now alive with profitable activity, are held under original agricultural titles. Not all were idle. Some, such as the Empire, have a continuous gold bullion yield of fifty consecutive years.

It is sometimes said, by way of contrast, "Had the gold quartz mines of California been exploited as thoroughly and fearlessly as the Comstock, deep mining in California would have been proved to be profitable twenty-five years ago." That is to be qualified by two important facts: First, such gold ores in California could not have been profitably treated then; there was no such combination of process and facility that now exist; mining and scientific progress have made profit possible. Second, the methods were always different, and are to-day. In the old, great bonanza days men never before saw such daring, such audacious, expensive exploitation of mines as was manifested on the Comstock. But this was because of the way the money was furnished. On the Comstock money was always to be had by the hundred thousand dollars just by assessing the stock, and thus was made possible the deep mining there. But this deep mining was only secondary; the men who levied the assessments and those who paid them little cared as to the mine itself; it was the street that was being worked; it was all a gamble—stocks were the prizes won or lost, not development nor dividends. Men neither knew nor cared whether Ophir or Lady Bryan or Sierra Nevada had a shaft 300 or 3000 feet deep; whether the breast of the drift was in bonanza or borasca; all they saw or thought was the daily quotations at the stock exchange or in the brokers' offices. The magnificent result was deep mining, paid for by the public.

In Nevada county and elsewhere in California, so far as gold mining is concerned, the profits derived from one level were depended on to buy machinery and pay for labor in sinking another 100 feet, or run another drift. The mine had to develop itself; there were no assessments paid up, regardless of amount, while the stock was surging up and down forty points a day. It was mostly individual effort or private partnerships; and the results are as different as the methods that actuated them.

Values of Mines and Mining Stocks.

Reference is made in adjoining column to the avidity with which Comstock shares were seized a generation ago. In those days the value of the mine cut little figure in the street value of the stocks. Stocks sold at hundreds of dollars per share when the mining properties they represented paid no dividend, not even running expenses. Twenty-five years ago to-day—April 7, 1875—930 shares Bullion M. Co.'s stock were bought in the San Francisco Stock Exchange at $50 per share. The mine is still being assessed—No. 55 was the latest—and has never paid a dividend. No invidious reference is intended. The mine mentioned is merely typical of the way mining stocks went then. No one minded much, so there was a stock to play with.

In marked contrast is the present condition in the one lively mining share market to-day—that of Cripple Creek, Colorado—where the singular anomaly is presented of a higher cash price being paid in actual purchase of mining properties than the valuation of the stocks of those properties in the mining stock market. The Comstock mine stocks were manifestly too high; the Cripple Creek mining stocks are as manifestly too low.

There are several causes for the difference in mining stock market conditions past and present. The Comstock era was one of reckless speculation, a plethora of money and a general craze—the same frame of mind that now makes a man mortgage his home and start for Cape Nome—hope told a flattering tale, and men confused their dreams with static facts. Then, too, in those days were masters of mining stock manipulation. Not even Rhodes or Barnato outshone the old "bonanza crowd" of California and Nevada in ability to "boom" stocks. Again, in the old Comstock days there were cliques and combinations constantly clamoring for control of certain mines, and they kept prices up even of adjacent properties that profited by such contiguity.

Cripple Creek's mines are worth more than the market buying price of their stocks to-day because of lack of that warring element; because of cessation of speculative demand in the East; because of absence of such past grand manipulators as dealt the Comstock game; because of more active legitimate investment in mining property and development as a legitimate business proposition; because, too, the trend of the times is to hold possession of control in a more direct way than by the intermediary methods of the stock brokers, and, finally, because the increase of the value of the mines themselves outruns the belief of the outside buying public. The pendulum now swings the other way. The servant girls and clerks, the waiters and vegetable peddlers who bought Comstock shares, no longer invest their surplus money that way. Men who rightly understand the great value of Cripple Creek's gold mines are getting control themselves, and they don't do so much business with the stock broker. It is not so good for the stock broker, but, eventually, it means bigger sales of mining machinery, more men at work, greater mining areas discovered and developed, and more general prosperity for the State.

Gold Mining in Alaska.

Considerable inquiry comes regarding government requirements as to dredging for gold at Cape Nome and alien mining locations. Both matters are so mixed up by pending congressional action that, till the result of present legislation is announced, nothing of permanent value can be said. As to dredging, a government permit is required to mine at any U. S. point lying within three miles seaward from low-water mark. Such permit must be procured from Secretary of War Root, the War Department having jurisdiction over the navigable waters and coast line of the United States. Several such permits have already been granted, and more applications are on file. One license issued to a deputy auditor in the State Department—Geo. W. Easterly—gives him exclusive concession to operate dredgers 2000 feet outside low-water mark for a stretch of two miles along the Cape Nome coast. It seems to be a case of first come first served. Permits are only required of or by those who want to use mining machinery.

As to alien mining locations, the U. S. law is that no one not a citizen of the United States, or who has not declared his intention of becoming a citizen, can lawfully locate a mining claim in U. S. territory. Of course, it follows that any one making such location in ignorance or defiance of this law can not convey legal title to the claim, and any one buying such location under those conditions has no lawful claim to the property. This is not a State but a federal question, and Alaska being solely under federal jurisdiction, the matter is susceptible there of direct settlement. The present prominence of Cape Nome claims, by reason of the rush and the necessarily loose method of securing and transferring mining property there, makes the subject one of pressing present value to all interested.

There is now under discussion in Congress a bill which is muddling matters. All it does, so far as the copies of the bill received show, is to re-enact present legislation. Section 73 of this bill is the most important. It says:

Aliens shall not be permitted to locate, hold or convey mining claims in the District of Alaska, nor shall any title to a mining claim acquired by location or purchase through an alien be legal. In any civil action, suit or proceeding to recover possession of a mining claim, or for the appointment of a receiver or for an injunction to restrain the working or operation of a mining claim, it shall be the duty of the court to inquire into and determine the question of the citizenship of a locator.

But this is precisely what the present federal law prescribes. There are "protests" going forward to Washington from California and elsewhere against the passage of this pending bill; but the fact that there is at present a federal statute which prohibits aliens from locating mining claims, and makes illegal any claim or title acquired by purchase of such location, makes unnecessary the passage now of a law which only re-enacts this, and makes the "protests" of anybody against such work of superorogation.

It used to be said that "nothing succeeds like success." In mining nothing succeeds but success, and success depends largely on exact, technical knowledge subordinated to the interests and requirements of business where in actual practice with experience is applied the knowledge gained. The man who knows one or two things well is better fitted for mining supervision than the theorist who knows only a little on a variety of subjects. This is the age of specialties and specialists, and the "all-round man" is not in such demand as formerly. Thousands yearly go out of schools of one kind and another with their heads crammed full and their hands empty, and are not of as much use to themselves or the men they seek to serve as though they had better and surer grasp of fewer things and were thoroughly grounded in definite practical knowledge of that which they essay to do.

Usually whenever a new factory or shop or store or business office of any kind is opened, it means more competition, a probable lessening of price, a threatened curtailment of profit to others already established there in that line. 'Tis different with a mine. A new mine means more money; more customers for the merchant, the manufacturer, the farmer, the railroad; it means addition to the world's wealth, a creator of money and of business, a liberal buyer of labor and material. There is no rivalry in the sale of the product, no throatcutting competition to secure a customer. Nor is there a monopoly. The best producing mine may be duplicated without antagonism from other mine owners. And the miner is always a good cash customer, consuming the production of every other industry without competing with any other producer.

In the issue of the 24th ult. editorial reference was made to the strike of the machinists. Since then mutual concessions and wise counsels have prevailed, and telegrams to this paper during the week from prominent mining machinery manufacturers in Chicago say that the strike has ended, and that all the men have returned to work in the shops. Present orders and contracts made complications doubly undesirable, and it is of mutual profit to employer and employe alike that the recent differences have been satisfactorily settled.

Concentrates.

WATTS ÷ 746, or kilowatts × 1.34 = H. P.

OSMIUM'S SPECIFIC GRAVITY is 22.477; gold, 19.265.

A FOOT of fuse will burn from thirty to forty-five seconds.

A MILL SITE, when entered, must be shown to be non-mineral.

PEROXIDE OF HYDROGEN is an antidote for cyanide poisoning.

IN Michigan "a barrel of copper" is 900 pounds weight of that metal.

COLORADO is now the "Gold State," and Montana the "Silver State."

FEBRUARY, 1866, had no full moon; February, 1900, had no new moon.

3, 5, 1, 4, 2 is common stamp-drop succession in California in a 5-stamp mill.

FOR any number of copies of any current issue, whether 1 or 1000, the charge is 10 cents each, delivered.

WITH a head of 50 inches, 4½ cubic feet of water per minute will discharge through a hole 1 inch square.

THE bottom of the shaft of the Kennedy mine, Amador county, Cal., is 700 feet below the level of the sea.

PROBABLY as large a pay chute as any in California is that of the Gwin mine, Calaveras Co.—1400 feet in length.

IN law a vein or lode is not known to exist until after an actual discovery of the vein matter within a given location.

IN the second "Concentrate" in this column in the issue of the 24th ult., the word "side" should have been "end."

A COMPLETE illustrated original article on "Turquoise Mining in New Mexico" appeared in the issue of March 6th, '97.

NITROGLYCERINE freezes at 46° F., and giant powder, when not actually frozen, may become chilled, thus needing care and attention.

HOW TO LEACH a low-grade copper ore too siliceous to smelt was summarized in an original article in the issue of August 27, 1898.

NATIVE CRYSTALS of Michigan copper show about the same percentages of silver and iron that are found in refined electrolytic copper.

FROM 20% to 50% more water can be evaporated per pound of fuel with a well-arranged, clean boiler than with one that is badly scaled.

A PARTNER is not liable for the price of goods sold to his copartner over his protest and after notice that he would not be bound for same.

CRIPPLE CREEK, COLO., men think that the rapid consolidation of mining properties there will tend to do away with the leasing system.

SALT LAKE CITY, UTAH, miners are forming an independent smelter company. Their project includes works for the treatment of zinc ores.

ORDINARY yellow bar soap rubbed well into the threads of a pipe (the grease being thoroughly removed) will make a petroleum-tight joint.

WHENEVER tar is used for a mine cable linseed oil should be added to keep the tar from adhering, both ingredients to be mixed while warm.

DYNAMITE is 75% nitro-glycerine, 25% infusorial earth; "giant powder" is 36% nitro-glycerine, 48% nitrate of potash, 8% sulphur, 8% resin or charcoal.

THERE is no fixed law for determining the size of wire to be used in induction coils. The primary is made large enough to take the current it is proposed to use.

WHEN mineral is discovered on land already patented in good faith as agricultural land, the title of the owner to the mineral so discovered is not jeopardized thereby.

ALUMINUM and steel are of equal strength in ratio to their weight. A small percentage of copper in aluminum increases its tensile strength in proportion to its weight.

EACH patentee is liable to all prior patentees to the extent to which he adopts their principles of invention in making a device which embodies his patented improvement.

THE 8.7-cent gravel to the cubic yard in the North Bloomfield hydraulic mine, Nevada Co., Cal., produced a net profit of $411,589.27 out of a gross product of $1,435,680.47.

PROSPECTING and mining are permitted within Government forest reservations under regulations of the Secretary of the Interior. The Yosemite, Cal., reservation is not so open.

THE Empire mine, Grass Valley, Cal., has been worked continuously for just fifty years: it has produced nearly $8,000,000 and is now being worked at a depth of 2500 feet on the incline.

CARBIDE OF CALCIUM is perfectly safe to handle if no water comes in contact with it. To preserve it, use an airtight vessel with no outlet; any outlet will simply cause it to decompose.

ABOUT one-fifth of the debris in California rivers and bays is due to hydraulic mining: the remainder is mainly due to natural erosion, cultivation of the soil, settlement of the country, increased population, etc. Mining, however, is responsible for such cultivation and settlement; indeed, it is to be held strictly accountable for all of California's prosperity.

"WET" ore has a high percentage of lead or copper, say, 40% lead or 20% copper. "Dry" ore contains a much smaller percentage. Smelters rarely pay for less than 5% lead.

CHRYSOPRASE is a rare variety of chalcedony, and is of value. It is found in limited quantities in Tulare county, Cal., in Jackson county, Oregon, near Rutland, Vermont, and in lower Silesia.

AN aperture 12 inches high by 12¾ inches wide through a 1½-inch plank, with a head of 6 inches above the top of the opening, will discharge 200 miner's inches, each equal to 1.4994 cubic feet per minute.

FOR luminous paper: 10 parts water, 40 parts paper pulp, 10 parts phosphorescent powder—bought ready made—1 part gelatine and a part ditchrom, acid potash. Mix and coat article to be made luminous.

THE U. S. Land Department considers a placer location covering 160 acres as one claim, on the assumption that eight locations are united in that amount; on each, $500 of work must be done to secure patent.

"CONCENTRATES" is unable to recall cognizance of any known cases where only part of a charge of giant powder has exploded, leaving a part of the charge intact, which was exploded later with another primer.

IN a mining partnership any one of the partners can quit whenever he wants to. His responsibility for expenses incurred up to the time of his quitting must be determined by the nature of the agreement made.

CONCENTRATION of low-grade cinnabar ore is not ordinarily deemed effective or advantageous; reduction of such ore is not expensive; the cost is in the mining, and no method of handling it could lessen the latter.

AN ampere expresses the rate of flow of electric current. An ampere hour means a current flowing for one hour at the rate of one ampere. At 110 volts one ampere hour should mean two 16-candle power lamps for one hour.

POSSIBLE and sometimes probable loss in commercial assays for silver arises from silver remaining in the slag, absorbed by cupel or volatilized in the crucible, scorifier or cupel. Crucible assays are usually the least liable to such possibility of loss.

IT sometimes occurs with Eastern or foreign promoters that they prefer to place mines or prospects from new districts where less information is obtainable, that their claims or assertions may not be too closely questioned or successfully contradicted.

TIME was in Australia when a convict who discovered gold in New South Wales was rewarded by 100 lashes on the back. Now the Government buys cyanide patents and makes concessions to gold finders. It also has an executive department of mines and mining.

"ARTESIAN POSITIVE," as applied to wells, means one from which the water rises above the surface; "artesian negative," one in which the water does not rise to nor flow above the surface. "Phreatic" water is that nearer the surface and derived from absorption.

COPPER may be given the appearance of platinum by immersion in a bath composed of 1¾ pints hydrochloric acid, 7½ ozs. arsenic acid and 1½ ozs. acetate of copper. The article should be thoroughly cleaned before immersion, and left in the bath till it has the color of platinum.

CONTINUOUS possession of a mineral claim, with due compliance of law, for a period equal to the time prescribed by the statute of limitations for mining claims, in the State wherein such claim is situated, entitles the claimant to a patent in the absence of any adverse claim.

IT is not uncommon to use an iron open tank filled with water and connected with the water jacket of a gas or gasoline engine in such a way that a continuous circulation of water through the cylinder jacket takes place, the large surface of the iron tank being sufficient to keep the water cool.

HYDRAULIC mining as legally defined in California is mining by means of the application of water under pressure through a nozzle against a natural bank, but in general the term is applied to any form of mining in which water is used to remove or separate the ore or metal from its original site.

ADVERTISING California mining stock as "non-assessable" makes no difference. It is assessable, and stockholders are responsible for the amount of assessments on corporate stock held by them. The endorsement "non-assessable" on the stock certificates, written or printed, does not affect the question.

A SURVEYOR'S STEEL TAPE, if broken, can be readily mended by taking a piece of copper ¾ inch long, in width a little over twice the width of the tape, folding it around the joined ends of the tape and soldering it to them. A weak solution of muriate of zinc is used in connection with plumbers' solder and a blowpipe.

THE Bullion, Nevada, mine is a monument to the possibilities of the assessment system. The mine has been worked almost continuously for twenty-seven years. It has never paid a dividend, nor even running expenses. Upon the stock have been levied fifty-five assessments, the last being 5 cents per share, Sept. 20, 1899.

WHERE co-owners of an unpatented mining claim are advertised as delinquent on assessment work they have 180 days from the time of the commencement of the first publication in which to pay up. The usual wages in a mining district determine the value of days' work in doing necessary annual assessment work.

BADLY burned steel is not easily restored. If not too far gone, the tools might be heated to a bright red and allowed to cool in a mixture made as follows: Melt 500 parts tallow and 120 parts black pitch together, and while that is being constantly stirred, add gradually 375 parts pulverized sal ammoniac, 125 parts ferrocyanide of potash, 20 parts soft soap, and a handful of salt.

CHROME ore has been a California production for forty years. It is mainly produced in Tehama, Shasta and San Luis Obispo counties. Only ore carrying over 50% is worth working. It is worth about $10 per ton in San Francisco and is shipped round the Horn to the East where it competes with the duty free chrome from Russia, Turkey and the Black Lake district in Canada.

THERE is considerable difference between the specific gravities of Eastern oil distillates and those of California oils. Viscosity of distillate or reduced stock being equal, the gravities are from 5° to 6° B. lower in California oil fractions than in those of Eastern oils. Flash and fire tests are from 10° to 30° F. lower in California oil distillates than in Eastern distillates of the same gravity.

THE bursting pressure of steam pipes can be increased. With pipe over 8 inches in diameter, winding with $\frac{3}{16}$-inch copper wire almost doubles the bursting pressure. Steam pipes are now manufactured of copper of the thinnest possible gauge for the interior or core of the pipe, the body proper being composed of steel wire wound tightly around the core, and the interstices filled in solid with copper by electro-deposition.

IN the case of Hartman vs. Smith, 7 Montana, 19, the Supreme Court of that State held that "all that is necessary to make the claim of a mill site by the owner of a non-contiguous mining claim valid is the reasonable use and occupation thereof for mining purposes in connection with a mining claim. A mill site may be patented by compliance with the same requirements regarding survey and notice as are applicable to veins or lodes."

THE duty of stamps—that is, how much ore per stamp a battery will crush per day—is a variable factor in mill practise. It is not uncommon to have a stamp mill average five tons per stamp per twenty-four hours. The mill of the Baliol G. M. Co., Sutter Creek, Amador Co., Cal.—forty stamps of 1000 pounds each, 4-inch drop, 9-inch die, 102 drops per minute—has averaged 5.35 tons per stamp each twenty-four hours, for a month at a time.

IF an electrode of carbon surrounded by powdered carbon in a porous cup be immersed, along with a platinum electrode, in an electrolyte of sulphuric acid in a glass jar, it is possible to develop electricity without extraneous heat. Chlorate of potash is added to form peroxide of chlorine, whereby the carbon is oxidized and electricity generated of an electromotive force of 1.3 volts per cell, the current being about 0.4 of an ampere.

THE discoverer, owner or operator of a mining claim, to which he has a patent, has a right to follow the dip of the vein under agricultural or timber land if his is the senior title; that is, if his patent antedates the patent or possessory right of the holder of the adjoining agricultural or timber land; but if the patent to the agricultural or timber land is of a date preceding that of the mineral claim the owner of the latter has no such right.

IN June, '97, in the U. S. Circuit Court in California, in a case then decided, the Caminetti Act was held to be constitutional, and the Debris Commission was declared to have right to regulate "hydraulic mining." Nothing has occurred since then to warrant any assumption that if the constitutionality of that Act were again attacked by the Anti-Debris Association or any one else, that the decision of any court of competent jurisdiction would be different.

GOLD MINING is the one form of metal mining now unaffected by trusts, trade combinations, or even the usual law of competition or business rivalry. It occupies the unique position among the business industries of the world of being the one form of production where the customer seeks the producer, where there is no "overproduction" or "want of consumption," where the same price prevails as did thirty years ago, and where conditions make it impossible for any combination to control its price or volume of output.

WHEN putting up shafting it is well to take into consideration the load that will probably be put on each pulley, and the way in which it is fastened to the shaft, and, not only this, but the way in which the load is likely to be thrown on, for in many cases where pulleys are fastened on with set screws only, when a heavy load is thrown on suddenly, the set screws fail to hold, the result being a thread cut on the shaft which is of no special use to any one, but it prevents the pulley from being moved easily back into place.

DILUTED sulphuric acid has no action on silver, but the strong acid when heated is decomposed by that metal, giving off sulphurous acid and forming silver oxide, which passes into solution in the excess of acid as silver sulphate. If gold is present in moderate percentage, say not to exceed one-third of the whole, strong sulphuric acid will extract the silver and leave the gold as a granular brown sediment. Should, however, the bullion contain anything like one-half gold, the latter metal would protect the silver against acid attack, and the result would be failure.

Westinghouse Type "C" Induction Motors.

During the last two years great strides have been made in the application of alternating current apparatus for the distribution of power in factories, mills, mines and other industrial establishments.

The type "C" form of induction motor manufactured by the Westinghouse Electric & Manufacturing Co., in its wide and varied application in numerous industries, fully justifies the enviable reputation it has established. The largest size at present constructed is rated at 850 H. P. The illustrated engraving, Fig. 1, shows a 500 H. P. machine built for direct coupling, which is in operation at East Helena, Mont., in the plant belonging to S. T. Hauser. Two other motors of similar size have been shipped to the City of Mexico. A considerable number of smaller size, from 200 to 300 H. P. each, are employed in California and elsewhere for operating flour mills, elevator machinery, general shafting in factories and for other purposes.

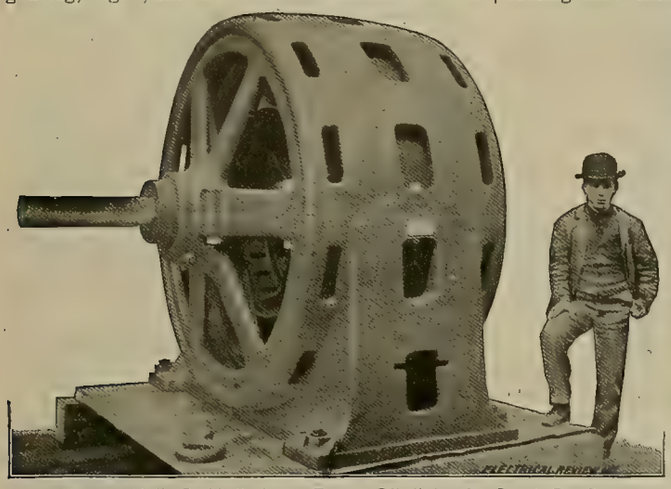


Fig. 1.—500 H. P. Westinghouse Type "C" Motor for Direct Coupling.

The department of the Westinghouse factory devoted to the construction of type "C" motors has been busily occupied in meeting the large demand for this class of machinery. Several new mills and factories will be entirely equipped with polyphase apparatus; and in many cases where additions are being made to established plants, old machinery is being abolished and Westinghouse type "C" motors substituted.

The type "C" motor is of simple construction, and approaches, on that account, more nearly to an automatic machine than some electrical apparatus. It has two main elements, the primary, directly magnetized by the current supplied from circuits; and the secondary, in which low potential currents are induced by the action of the primary. The windings of the primary are so arranged that when supplied with polyphase current, a rotating magnetic field is produced. This field acts upon the secondary winding and induces current therein, and rotation is produced. The revolving element in an induction motor may be either the primary or the secondary, but usually the primary is stationary and the secondary revolves. For purposes of comparison with a direct current motor the primary may be regarded as corresponding to the field magnets, and the secondary to the armature.

The primary element shown in Fig. 2, consists of a hollow cylinder built up of laminated rings of sheet steel, slotted on the inside to receive the conductors. The rings are rigidly supported by the cast-iron housing that encloses the primary and forms the frame of the motor. In motors of large sizes the rings are not continuous, but are made up of segments that are dovetailed and fitted into corresponding slots in a hollow cylindrical shell of cast iron, which is held in the cast-iron frame of the motor. The conductors are usually machine-wound coils of wire that are thoroughly insulated before being slipped into the slots of the primary iron core. In some of the larger motors copper strap bent into the proper form is used instead of wire for forming the coils. In large motors wound for low voltages, in which the large current requires a corresponding carrying capacity, a copper bar is placed in each slot; the insulated bars are slipped in at one end and the connections between bars are made by short lengths of copper strap. The terminal blocks, through which the leads supply current to the motor, are connected to the primary winding, and placed on the top of the motor, or in motors of large size, on one side.

The standard motors in sizes of ½ H. P. up to 200 H. P. are provided with a hollow cylindrical frame of cast iron, in which the primary is mounted, which forms a base for the machine and also supports two end brackets carrying the self-oiling bearings. Perforated iron plates fitted into these brackets protect the rotating element and permit excellent ventilation. They may be replaced by solid plates when it is desired to make the motor absolutely fireproof. It will be noted that the housing completely encloses the primary and the secondary elements and protects them from any external damage. Motors of large size are of the same general form, but the cast iron frame for holding the primary is made in two parts, separated horizontally, as shown in Fig. 1.

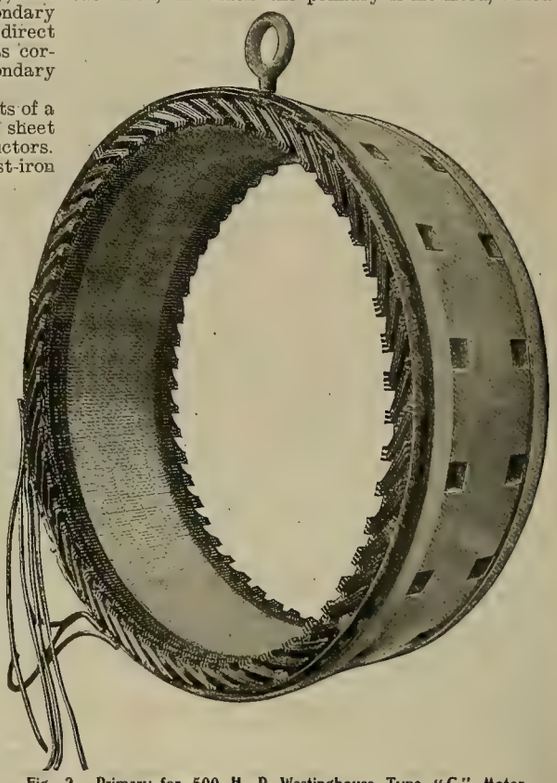


Fig. 2.—Primary for 500 H. P. Westinghouse Type "C" Motor.

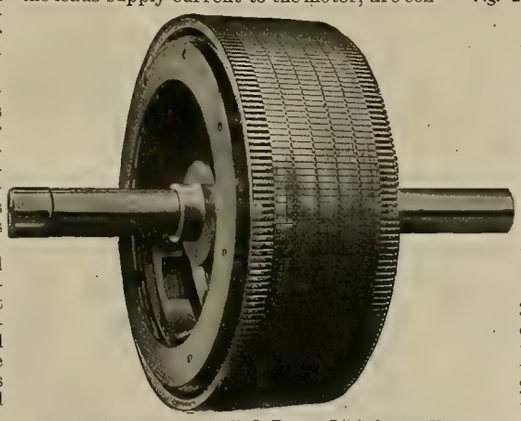


Fig. 4.—Armature for 150 H. P. Type "C" Induction Motor.

Type "C" constant speed motors are built for two-phase or three-phase circuits, for 7200, 3600 or 3000 alterations per minute. Standard voltages are of 200 and 400 volts for motors up to and including the 200 H. P. size. Those for 3 H. P. and less are also wound for 100 volts. The standard for motors above 200 H. P. is 400 volts. From 50 H. P. to 500 H. P. they may be wound for higher voltages, but it is preferable to wind them for the standard voltages,



Fig. 3.—150 H. P. Westinghouse Type "C" Induction Motor With Pulley.

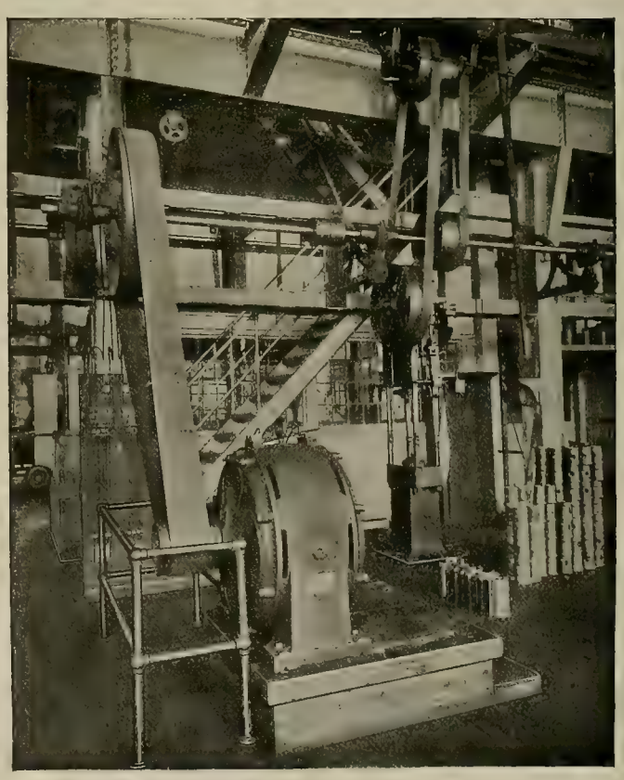


Fig. 5.—50 H. P. Westinghouse Type "C" Induction Motor for Driving Shafting.

as the wire is of much larger size than that which is used for the higher potentials, and in many cases the winding is made of copper bars or copper strap for the standards. Type "C" motors are also built with a variable speed for cranes, elevators, hoists and similar classes of work. The variable speed motor is almost identical in construction with the constant speed type, but is especially designed to give a different speed curve and is supplied with suitable regulating devices when necessary.

These motors maintain a high and almost constant efficiency from one-half load to a considerable overload. Motors are usually operated at considerably less than their full rated capacities; therefore, by maintaining a constant efficiency they secure an all-day or average efficiency very much above that heretofore possible with either direct or alternating current motors. The variation of speed between no load and full load is small, being less than that found in direct current motor practise.

On account of the absence of sparking and the safe and simple operation of type "C" motors, they have been largely introduced in grain elevators, powder mills, woolen mills, and other places, where they are exposed to inflammable gases and explosive material. For such installations the starting devices may be placed at a point more or less remote from the motor. This feature is also of value when motors are suspended from the ceiling or installed in some places not easily accessible.

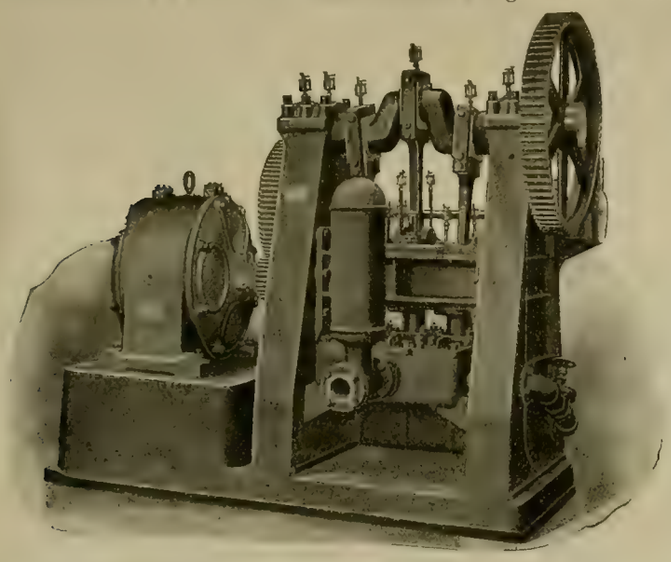


Fig. 6.—50 H. P. Westinghouse Type "C" Induction Motor Direct Connected to Pump.

Two Westinghouse type "C" motors have recently been dispatched to Paris, each of 850 H. P., which will be put in service to operate a moveable platform three miles in length, now being constructed in the Exposition grounds. These are believed to be the largest induction motors in existence.

The Golden Age of Science.

Above and beyond any particular gift of science—a new chemical element, a ray of new penetration, or even a new rule of physical and chemical action—there has been evolved something more and greater during this wonderful century: nothing else than perfecting the instrument by which discovery carves its path and particular rules are merged into universal law—the scientific method, now confessed the one trustworthy means for the winning all truth. Beginning in the comparatively simple sphere of natural science, it has passed to the more difficult fields of art, history, and criticism, to reforms social and political, moral and religious. In all its work, whether it has to do with the mere machinery of the livelihoods, or with the things of the mind and heart, the conscience and the will, it means reality, accuracy, fidelity to the directly observed and carefully comprehended fact. It disregards traditions, legends and guesses, however closely associated with great names or hoary institutions. In their stead it is erecting a new authority, which finds its sanctions in knowledge, in observation, experiment, reasoning, in untiring, impartial verification. When it gives play to the imagination and offers a conjecture in the hope that it may be helpful, the conjecture is plainly labeled as such, and is withdrawn the moment that a sound objection so demands. The man of science ever rejoices when he finds, as he often can, that men of old had a forefeeling of modern scientific truth; but, under all circumstances, he fully declares exactly what he discovers, however much his disclosures may cause a valued heritage to be disprized. Triumphs to us inconceivable doubtless await the centuries to come, but there will remain as the inalienable glory of the nineteenth that to the old question, "What is truth?" it first gave, not the old answer, "Whatever has been so considered," but "Whatsoever can be proved."

Scrip and the Law of Title to Oil Lands.

Written for the MINING AND SCIENTIFIC PRESS by A. H. RICKETTS.

The term "scrip" as used in connection with land matters may be defined as a writing issued by the Government certifying that its holder is entitled to as many acres of agricultural land as may be therein stated. The title obtained to land by the use of scrip is conditional until patent issues and, as a rule, is transferable, or practically so. Proceedings to secure the fee simple title for land upon which scrip is laid are initiated in the United States land office for the particular land district in which the land sought to be secured may be situated. An appeal lies from the decision of the local land officers to the Commissioner of the General Land Office, and from him to the Secretary of the Interior. The issuance of scrip is always authorized by an Act of Congress, and is generally intended to facilitate an exchange of lands between the United States and the individual or persons to whom it is issued. That is to say, the Government takes certain definite, ascertained tracts and gives to the scrip holder in return therefor the right to select other lands of the public domain which are non-mineral in character in lieu thereof, without any act upon his part as to improvement, residence and so on thereon. In some instances the selection may be made on either surveyed or unsurveyed land, and in some cases only upon the former. That depends upon the provisions of the particular Act which authorizes its issuance.

Scrip is known by different names—for example, Valentine scrip, Porterfield scrip, Sioux scrip, Soldiers' Additional Homesteads, Agricultural College scrip, etc. It has different values in the market, due to its scarcity or the rights which may be secured under it. Valentine scrip was quoted at from $50 to $60 an acre prior to the passage of the Act of June 4, 1897, which Act allows selections in lieu of surrendered lands within forest reserves. That Act grants the right of selection on either surveyed or unsurveyed land, and hence robbed Valentine scrip of its chief value; since then there has been no market price for that scrip.

Porterfield scrip is of limited issue, but it acquired enormous value, running from $100 to $125 an acre, because it was the only known scrip that could be used to locate townsites. There is but little of it in the market and there is no definite quotation.

Sioux scrip was originally issued to compensate the Sioux Indians for land ceded by them to the United States. This scrip could never be practically located by any one except the Indians, but by means of powers of attorney speculators used a large quantity of it. The price ranged at different times from $5 to $20 an acre. This scrip is practically out of the market.

Soldiers' Additional Homestead scrip has been much used by land speculators. This scrip was issued under an Act by which soldiers who had failed to perfect title to the full amount of 160 acres were allowed the right to select a sufficient quantity of land to make up the complement, and, being assignable, was bought up in large quantities by speculators. The price ranged from $2.50 up to $20 an acre at different times. There is still considerable of this right being sold for from $4 to $6 an acre.

Agricultural College scrip was issued to the different States in large quantities, but could only be used on lands which were offered for public sale or by preemption or homestead claimants in making payment for their lands. The price, therefore, was always less than $1.25 an acre. This scrip is practically exhausted.

There are other classes of scrip, but the foregoing are the most important.

Under the Act of June 4, 1897, commonly called the "Forest Reserve Law," and which has led more than anything else to the present agitation in land selections, it is provided, "That in cases in which a tract covered by an unperfected bona fide claim or by a patent is included within the limits of the public forest reservation the settler or owner thereof may, if he desires to do so, relinquish the tract to the Government and may select in lieu thereof a tract of vacant land open to settlement not exceeding in area the tract covered by his claim or patent."

Here, no provision is made for the issuance of any scrip. Therefore, the term "scripper" is a misnomer when applied to one who exercises such right of selection; that appellation is also with equal inaccuracy bestowed on one exercising a homestead right or one making a State lieu land selection.

In order to effect the exchange of lands authorized by the forest reservation law the settler or owner of lands therein seeking to exercise such right duly executes a deed thereof to the United States, causes the same to be recorded in the office of the proper county recorder, and thereafter with the evidence of its recordation duly endorsed thereon, files such instrument in the proper local land office accompanied by a full and complete abstract of title of his holding in the reservation sought to be exchanged and his application to select certain other land of equal area chosen by him as a fair exchange with the Government. These documents are accompanied by an affidavit showing the land selected to be non-mineral in character. There is perhaps nothing to preclude the transfer of lands within a forest reserve from one person to another, nor to limit the amount of such lands which any party may obtain by purchase and exchange the same for land lying elsewhere. Rights within the forest reserves are at present sold for about $4 to $5 an acre and are in great demand, as it is believed by many that the right of selection being exercised as above stated, the title immediately vests in the selector or "scripper," and this particularly when the land selected is shown upon the land office records to be agricultural land. Possibly, this may be so where patented land is the basis of the lieu; otherwise, perhaps, no more than a preferential right of entry can be obtained by such action.

The forest reservation policy is of comparatively recent origin, the first effort in that direction being an Act of Congress of September 25, 1890, reserving seven townships in Tulare county, followed by the Act of October 1, 1890, creating what is known as the Yosemite National Park, embracing about forty townships in Tuolumne and Mariposa counties.

On March 3, 1891, Congress passed an Act authorizing the President of the United States to create any further reservations when deemed necessary, and under this act President Harrison reserved immense bodies of land on the slopes of the Sierra Nevada, San Gabriel and San Bernardino ranges of mountains. Just before President Cleveland retired from office he made reserves including the western slope of the San Jacinto mountain, in Riverside county, and extended the reservation still farther north on the Sierra Nevada range. These reservations in terms included all of the land within their exterior limits, excepting only those to which title had passed which would have the effect of preventing any further prospecting or development of the mineral resources worked therein. This condition very justly alarmed the miners, and many protests were sent to Washington against these reservations. This agitation led to the passage of the Act of June 4, 1897, in which it was declared that as to the reservations already created and those that might thereafter be set aside (which, of course, includes the Lake Tahoe forest reserve), it was not the purpose or intent to authorize the inclusion therein of lands more valuable for the mineral therein or for agricultural purposes than for forest purposes, so mining may still be conducted and farms maintained within such reserves.

It was not until November 15, 1899, that any rule of the land department existed requiring the character of land selected under the law of June 4, 1897, in lieu of land within the forest reserves to be subsequently inquired into. The existence of that rule may be attributed to the recent agitation regarding oil lands within this State with which all newspaper readers are familiar.

Theoretically, this rule is favorable to the miner. Its promulgation was forced upon the department because it appeared that the majority of applications for title to lands under the law last mentioned were for lands marked "agricultural" upon the townsite plats, and it was necessary for the public interests and to prevent the absorption of the mineral oil lands as agricultural land through the instrumentality of insufficient returns of the character of such lands, as shown by the records of the land department.

Its effect is hampered, however, by the rule requiring that the land selected be shown to be more valuable for mining than for agriculture by the actual production of mineral and allowing the miner no certain time in which to demonstrate that fact. It is to overcome this condition that Congress is now being asked to enact a retroactive law by the miners of this State.

Any competent person may avail himself of the benefit of the Homestead Act by making proper application to the local land office in which the land he seeks to appropriate is selected. This right is limited to 160 acres and withdraws the land from the public domain for the period of six months without further act on the part of the applicant. This is not a popular way of acquiring land for speculative purposes, as the perfecting of the title requires settlement, residence and cultivation. No patent issues until the expiration of fourteen months from the date of the entry and that period may be extended to five years as the homesteader may elect, but until patent issues no part of the land can be legally alienated except for public purposes. In addition to the non-mineral affidavit required in other cases the homesteader must show that his entry was made for the purpose of actual

settlement and cultivation and not either directly or indirectly for the use or benefit of any other person.

Under the Act of Congress passed in 1853 every sixteenth section and thirty-sixth section of the public lands not wholly or in part mineral were granted to the State of California for school purposes. The title passes to the State when the land is surveyed without any other action of the land department. Whenever the land therein is or is found to be mineral in character, previously disposed of or within a prior grant, the State has the right to select elsewhere the number of acres lost to it because of such fact. This selected land is called "lieu land" and the right to make the selection is sold by the State to competent persons at the uniform rate of $1.25 an acre, but the market price is about $4 an acre. Lieu land selections are, however, practically exhausted, for want of a basis upon which to predicate them. The proceedings to obtain title to such lands is initiated by filing a proper application in the State land office at Sacramento. The selection must be approved and "listed" to the State by the United States Land Department at Washington before patent will issue from the State. The listing of the land to the State is equivalent to the issuance of a patent to it. The right of selection given by the State to any one person is limited to 320 acres for cultivable lands and 640 acres of uncultivable lands, but as little as a fractional part of an acre may be procured. The person making the selection is required to show that the same is entirely for his own benefit and that the land is non-mineral in character, mineral lands being excepted from selection. In cases where it appears that a part of the land covered by a lieu selection is mineral a segregation survey of the land, as it is called, is ordered, and the mineral portion of the land is excluded from the selection.

It will be seen from the foregoing resume that the forest reserve law furnishes the most prolific source of present trouble to the petroleum oil miner.

The term "scrippers" is not sanctioned by the lexicographers, but is probably as good as any other that could be devised. Its appearance was contemporaneous with the initiation of the present conflict between the different sets of claimants to lands lying within the petroleum belts of this State and situated within the public domain. It is applied to all persons who seek to acquire an agricultural title to such lands as non-mineral in character under rights, more or less inchoate, arising under general or special laws of the United States affecting the disposition of the public domain to private parties as agricultural lands, as well as to parties making State lieu land selections.

The word "scrippers" is used generically in this State as distinct from that of the term "oil miners," which latter comprehends all persons who seek to obtain title to lands valuable for petroleum or other mineral oils under the mining Acts of Congress. Both classes of claimants may be said to be indigenous to this coast, as the question of ownership of such lands which arises between them does not exist in the older settled States, or, for instance, in the city of Los Angeles, where the oil wells are situated upon lands which had previously passed into private ownership. Such question is only possible where both parties seek to divest the Government of its title to the same portion of the public domain under the different laws provided by Congress for that purpose.

Congress has divided the public domain into two great classes of land—agricultural and mineral; and the mineral lands are subdivided by it into two classes of mining claims, viz: lode and placer; the character of the deposit and not the manner of its working determining its classification. Congress has promulgated different systems of laws for the acquirement of each class of public lands by qualified persons, and empowered the land department to formulate rules to carry out the purposes of the Government.

(TO BE CONTINUED.)

The Chinese and the Telephone.

In circumstances where the telegraph is debarred from the direct conveyance of word symbols the telephone enters with peculiar value. Until Prof. Bell perfected this invention a Chinese was denied by the structure of his language any immediate transmission of it by electricity. Chinese has no alphabet, and its written signs are so numerous and intricate as to defy reduction to a simple telegraphic code. Two methods proffered themselves—first, to translate a Chinese message into an alphabetical tongue, telegraph this, and at the receiving station run the risk of error in retranslating into Chinese, or, in the original Morse method, giving a number to each word in a dictionary, and telegraphing numerals, to be matched as received with their appropriate signification.

With the telephone all this hazard and trouble vanish at once. A Chinaman speaks his message; it is received exactly as spoken, either by his correspondent or his correspondent's scribe. Louis Glass of the Pacific Telephone & Telegraph Co., San Francisco, states that his company has a substation in San Francisco, employing three Chinese attendants. "Their ejaculatory language gives peculiarly good telephonic results. The Chinese do a very large long-distance business throughout the whole Pacific coast, and apparently with more satisfactory results than English-speaking subscribers."

The Evil Practise of Ore Stealing.

Correspondence Denver, Colo., Post: Sooner or later all the mines that produce ore of more than average grade are obliged to consider the question of ore stealing. The greatest loss is not sustained, as one might imagine, from the bandits who raid the ore bins, burglarize ore houses and even invade shaft houses and hold up the top men while the mineral is being taken. Such robberies are costly enough, to be sure, but they pale into insignificance beside the constant leakage that results from the abstraction of rich specimens by the miners themselves.

The miner who breaks the gold-laden quartz, the trammer who takes it to the surface and the ore sorter who classifies it are all subject to the same sort of temptation that presents itself to a street car conductor without a register. If anything the conductor's temptation is the least enticing, for he works in public, while the miner is alone with the gold and the tempter for hours at a time.

At first it is just a little specimen to exhibit to wondering spectators. Then a few more specimens to distribute among solicitous friends. All this is so easy that the miner amuses himself by picturing in imagination the things that might be purchased and enjoyed with the money represented by a ton of the rock he is handling. Perhaps he calls to mind a pretty house that some other man has built with the proceeds from contraband ore. Then he makes inquiries and learns of a safe and comfortable method of disposing of the mineral if he should decide to take some.

The day comes when he puts a few handfuls of the pay streak in his pocket or dinner pail. He conceals it at home and goes back on his next shift in fear and trembling, half expecting that the whole mine will be ringing with the news of his pretty larceny. But it isn't, and when he finds that everything is going on as usual his courage returns, and he continues to add to his store until he has enough ore to make a private shipment. There are men who make a business of buying this sort of shipments. Some of them pose as assayers and other as legitimate ore buyers. Any of these people will pay half the real value of the shipment, and if the seller is very determined and very bold he may get a little more.

It should not be assumed that this is the experience of all miners, for there are hundreds of them who would not steal and who call such a traffic as this stealing. And there are other hundreds who do not work in high grade ore, and therefore find honesty not only the best but the only policy possible.

The men who have forced themselves into silent partnerships with their employers usually consider themselves honest, and they probably would be if they had not become the victims of temptation and the slaves of opportunity. Some of them justify their conduct on the highest ethical grounds.

The writer has heard of mines in Cripple Creek district where every man from the superintendent to the muckers went over the rock and picked out what happened to strike his fancy. Cases where such examples have been set by those in authority could be named by the score. It is no wonder that some of the mines have received beggarly returns on ore that assayed in the pictures.

The owners and lessess soon discover that this pilfering is going on, but generally submit and say nothing while the loss is moderate. They realize that the separation of the honest from the dishonest in an impossibility, and they hesitate to make the innocent suffer with the guilty, beside a new force would in all probability be as bad or worse.

But when the "graft" is overdone the management either discharges all who are suspected or tries a system of espionage. The Independence, Stratton's great mine, has tried both. A few months ago one whole shift was "fired" without notice. That this did not have the desired effect is shown by the rule established recently that all the underground employes must change their clothes at the mine under the eye of a "boss" when they come off shift. At first glance such a system would seem to be perfect, but there are many mine owners who would rather face the loss than to adopt it, for it has a tendency to make every man a thief. To an honest man the best stimulant to honesty is confidence. The search system proclaims that every man is suspected, and a natural instinct impels every suspect to "beat the game." Men will take ore to outwit the management who would never have thought to take it for pecuniary profit. Men who would consider it a crime to steal when they went forth unsearched will look upon a successful passage of the blockade as a praiseworthy exploit. All this may not be true at the Independence, but those are some of the reasons why the search system was not long ago adopted at all the high grade mines in the district.

The problem is not to prevent ore stealing—that would be a ridiculous effort—but to keep it at a minimum.

Victor Colo., March 24.

Testing Gold Dredging Ground.

TO THE EDITOR:—I note the very interesting article in your issue of March 10 on the subject of "Testing Gold Dredging Ground," and observe some criticisms of certain statements made by me on the subject published in your issues of January 27 and February 3. May I have the privilege of a few remarks in reply?

In giving the weight of the light horse power prospecting outfit at 1000 pounds reference was, of course, only made to the machine and power. Neither the piping nor drill stems nor other loose and variable appliances were included. I will simply add that such an outfit has been in existence for nearly a year, and has done excellent work. It is anything but a toy.

The suction or vacuum sand pump is a desirable improvement on the plain pump, but I have not found that greasing the outside of the drive pipe interferes with saving the gold. If it did, it would indicate either that too much grease was used or that some material outside of the normal field of the pipe had been driven into it.

In a majority of cases assumed dredging ground is the property of miners, and is so located that transportation of machinery to it is expensive, and sometimes almost impossible without the construction of costly roads. There is, therefore, a genuine and extensive demand for a machine of light construction that will enable the miner to test such ground. He rarely has $1500 to invest in a tool that will weigh 10,000 pounds, and may cost $500 more to land on his property—and after that will require fuel and skilled attendance. But he can often rustle $500 for one that can be driven by a horse whim and operated by himself and partner.

Again, the holes to be sunk in the majority of cases will not average over 20 feet in depth, and will be practically all in soil and gravel. Surely a job of this kind need not require the investment of $2000 in a prospecting plant.

The prospecting of auriferous gravels is an entirely different kind of a job from well sinking in rock. Machines that will do rapid work are not necessarily the best for the purpose, for experience has shown that the vital point of the whole operation of gravel testing with a driller is to keep the shoe of the pipe always a shade ahead of the drill. Now, the principal feature of a certain style of horse power drill is that it is far more comfortable and easy for the operator to drive his pipe than to drill, while with most, or perhaps all, of the steam power machines the drilling is made such a simple and easy feature that, unless the man in charge of the test is continually on the watch, the bit is always in advance of the shoe, and as a result either some of the material that should be brought up is driven outside the field of the pipe, or, if pumping is frequent, a considerable quantity of material from the outside is brought in. In either case the sample is vitiated. Nor, to my mind, is a machine that will "go through anything" of necessity the most desirable for gravel prospecting; for if the ground is very full of large boulders it had better be abandoned at once. The quicker you turn it over to some other fellow the better off you will be. A little machine will show the presence of boulders just as quickly as a big one, and at less cost.

When alleged dredging property in a tract of considerable size is owned by or under the control of a wealthy corporation, and the question to be decided is not whether the land has payable value, but what the average value is, then a heavier, more costly and specialized machine is distinctly in order; and if the topography of the region and the claim will permit it steam can certainly be substituted with advantage for horse power. But to put an elaborate and expensive driller upon a piece of untested dredging ground seems to me as great a mistake as to build a 50-stamp mill to treat the ore that may come out of an undeveloped quartz vein, with only a 10-foot shaft upon it. THEO. F. VAN WAGENEN.

Denver, Colo., March 25.

Compressed Air for Rock Drills.

The following table is intended to show the approximate quantity or volume of free air required for operating rock drills, the air being delivered to the machine at sixty pounds pressure. These figures are necessarily approximate only, owing to the varying conditions under which each work is performed; but they will be found to apply closely to average conditions in rock of moderate hardness. A liberal allowance has been made above the actual requirements of new machines, to provide for wear, etc., but of course no allowance is made for leaky pipe, as this should not be permitted to exist. In soft material the actual drilling time will be short, and more drills can be run with a given size compressor than where the material is hard and the drills running continuously for a longer period, thereby increasing the chance of all the drills drawing on the compressor at the same time.

The capacities in this table are based on sixty

pounds air pressure; if seventy-five pounds are used, one-fifth more volume should be added; if ninety pounds, two-fifths should be added to the volume stated in the table:

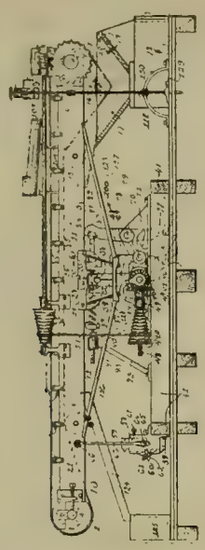
Number of Machines.	2½-inch.	3⅛-inch.
1	65	115
2	110	200
3	156	294
4	196	372
5	230	445
6	264	516
7	294	581
8	320	640
9	360	720
10	400	800
12	480	960
15	...	1,200
20	...	1,600
25	...	2,000
30	...	2,400
40	...	3,200

Latest Mining and Metallurgical Patents.

Patents Issued March 27, 1900.

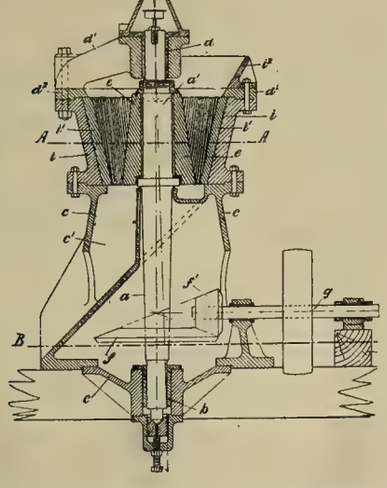
Specially Reported for the MINING AND SCIENTIFIC PRESS.

ORE CONCENTRATOR.—No. 645,987; W. E. Wild, Denver, Colo.



Combination with any suitable concentrator belt, suitable belt supporting pulleys, and supporting table or framework for belt and pulleys, of suitable foundation or bed plate of timbers adapted to form base of concentrator, journal boxes secured to opposite sides of bed plate, vertically disposed supporting frame pivotally journaled in boxes and arranged transversely across belt and table and at central portions of their length, having trunnions on its opposite ends, saddle plate secured transversely across bottom of belt supporting frame or table and box secured on one side of saddle and arranged to adjust itself independent of movements of table, to one of the trunnions of vertical frame and box on opposite side of saddle supported in vertical guideways formed in saddle and bearing on opposite trunnion of supporting frame, a screw threaded to saddle and arranged to bear on box, and means including a check nut for securing screw in an adjusted position.

ORE OR ROCK BREAKING MACHINE.—No. 646,204; E. Comerford, Liverpool, England.



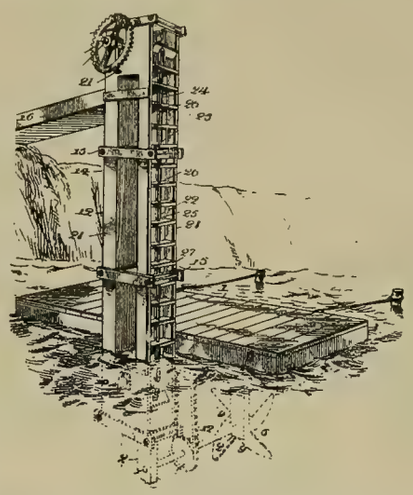
A rock, ore, or analogous breaking machine, the outer conical body having its axis vertical, an inner loosely mounted crushing barrel e, and a vertical operating shaft a, having its bearing axes at the upper and lower ends concentric with the axis of the body, and having an eccentric portion a′ on which the crushing barrel e is mounted and free to revolve, with its axis inclined outward from the upper end toward the lower end, whereby the eccentricity of the lower part of barrel bearing portion a′ is greater than the eccentricity of the upper part.

ROCK DRILL.—No. 646,343; R. Avery, Sausalito, Cal.



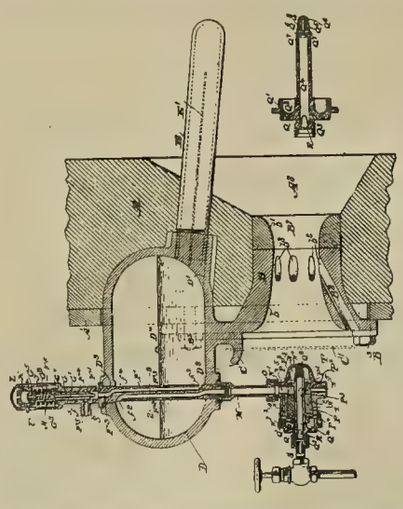
With fixed support, casing carried thereby, sleeve within casing through which drill shank passes, having a flange at one end with edge slots, a second sleeve in line therewith having arms engaging slots, and a reduced portion provided with ratchet teeth; a pawl engaging teeth, and means for actuating it, teeth formed on end of larger part of ratchet sleeve, a fixed ring having similar teeth so that the turning of the ratchet sleeve engages the teeth and moves ratchet and flanged sleeve back from fixed ring, grips carried by flanged sleeve to move drill in unison with sleeve, and a spring by which the parts are returned when the engaging teeth have passed each other.

CURRENT WHEEL.—No. 646,338; J. Winter and A. D. Gill, Landusky, Mont.



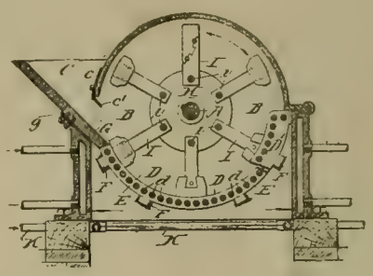
Combination of a float having depending hangers, a drive shaft mounted in the lower end of hangers, a current wheel keyed to projecting end of shaft, counter-shaft operated by driving shaft through suitable gearing, frame projecting below float, inclosed on three sides, to furnish one bearing for counter-shaft and to form a still-water space or well and a water elevator, as a chain pump, leading from still-water space or well, operatively connected with counter-shaft.

MECHANISM FOR THROWING SPRAYS OF OIL INTO FURNACES.—No. 646,352; T. R. Browne, Altoona, Pa.



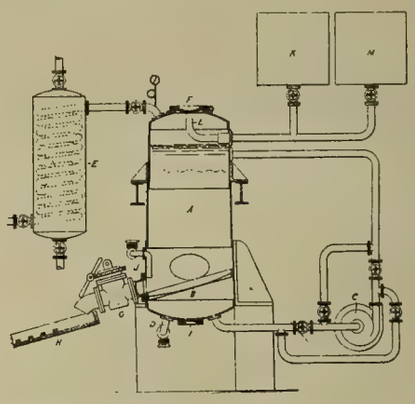
An oil spraying device comprising the receiving nozzle B and the steam box D attached rigidly together and having the steaming tubes E extended from the steam box in front of and above the nozzle, and an oil spraying fixture supported on the steam box in line with the nozzle, and in communication with the upper part of the steam box.

CRUSHER AND PULVERIZER.—No. 646,250; M. F. Williams, St. Louis Mo.



A crusher comprising a casing, rotary shaft, hammer support, secured on shaft, hammers pivoted to hammer support, consisting individually of a bar having a projection at outer end, a head having shoulder and slidingly mounted on bar, and one or more interposed pieces between shoulder and projection for adjustably limiting outward movement of head on bar under centrifugal action, and opposing devices co-operating with hammers.

PROCESS OF TREATING GOLD ORES.—No. 646,335; C. Wetherwax, Best, N. Y.



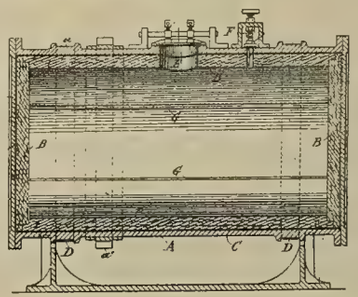
In treatment of gold ores for liberating gold from its combination or association with other element or compounds, a process which consists in digesting the ore under steam pressure in a solution containing water glass (sodium or potassium silicate) and caustic soda or caustic potash, caused to circulate through the ore.

PROSPECTING DISH.—No. 646,382; W. G. Collins, Coramba, New South Wales.



A prospecting dish or the like having an angle plate secured to its side wall and extending only portion of way around wall, the angle between inner faces of wall and projecting straight ledge of angle plate being not greater than 90°, whereby when dish is tilted during operation of washing a pocket is formed between plate and wall.

TREATMENT OF GOLD AND SILVER ORES, ETC.—No. 646,006; J. C. Montgomerie, Stair, Scotland, and Henry Parkes, London.



In the extraction of gold and silver from ores or compounds containing the same, process consisting in treating the ore or compound with a cyanide of an alkali metal, caustic alkali and barium dioxide in conjunction with ammonium sulphate.

The Thorpe Group of Antimony Claims, Austin, Nevada.*

Written for the MINING AND SCIENTIFIC PRESS by W. C. GAYHART.

Increased demand for antimony occasions interest in such mines as are producing or are capable of producing any considerable quantity of antimony ore, when economic conditions favor cheap and easy operation and transportation. The Thorpe group of mines, consisting of four claims, are seven miles south-southwest from Austin, Lander county, Nevada, where the owners, John Thorpe & Son, reside. These claims occupy the summit of a lofty spur that extends to the westward from the main ridge of the Toiyabe mountains, at an elevation of 9000 feet above the sea and 3000 feet above the adjacent Reese River valley which they overlook. The sides of this spur slope about 32° from the horizon into narrow canyons which extend with easy grade to the valley.

The claims extend from the spur southeasterly along its crest, including 6000 feet of the ledge, crossing the axis of the western ridge at nearly a right angle, along the summit of a low divide which connects the western with the eastern ridge of the Toiyabes and separates the headwaters of Big creek, a stream of some 500 inches flowing into Reese river on the west, from the headwaters of Birch creek, a stream of about the same size flowing into Big Smoky valley on the east. The vein may be traced toward Bunker hill, the culminating peak of the eastern range. It appears to mark the anticlinal of an early geological time.

Throughout the length of the group the ledge projects above the ground as an immense dyke, some 80 to 90 feet in breadth, and upward 20 to 30 feet. In only one or two places does it appear to be partially buried and then by the product of the disintegration of the mountain slates and shales. At the surface the dyke consists largely of quartz porphyry and breccia, a hard, dark-colored rock enclosing large pieces of irregularly shaped pieces of quartz; at the depth of a few feet this appears to give place to more uniform quartz in which is disseminated throughout stibnite ore carrying from 20% to 50% antimony.

Development has mostly been done near the center of the group, and consists of a crosscut through the ledge, showing ore the width of the ledge, at this point 80 feet. This crosscut is at the eastern end of the Mountain View lode, the most western of the group of claims. A few hundred feet east of the crosscut an incline shaft has been sunk 100 feet, near the western end of the adjoining Mammoth lode. In sinking this shaft thirty-five tons ore averaging 55% were taken out, and a larger quantity of ore averaging 20%. The facilities for sinking and hoisting are crude, and work was abandoned when the snow began. Little work has been done on the Commodore and Confidence lodes at the eastern end of the group, although the ledge there is equally promising. The ledge at the surface is in limestone and shale of the lower Carboniferous period, which at no great depth gives place to granite and diorite which here constitute the core of tne mountains. It is nearly vertical, dipping 10° from the vertical toward the south.

A good road extends from the foot of the mountain to Austin depot, and an abundance of wood grows on the mountains near the mine. The high grade ore is worth $45 per ton f. o. b. at Austin. Tests show that the low grade ore can be concentrated up to 75%, and such concentrates carry $5.16 in gold and two ounces in silver per ton. There is a small supply of water at the mine, but for extensive operations water would have to be pumped three-quarters of a mile and raised to an elevation of 1000 feet. The character of the surface is such that 1000 feet of tunnel would give approximately 600 feet of backs, intersecting the ore chute at its central point, from which, at the surface, it appears to extend some 200 or 300 feet in each direction. The owners are now fitting up improved hoisting machinery, preparatory to sinking 100 feet farther this spring.

* See illustration on front page.

Origin of the Telephone.

Prof. A. M. Bell, hale and hearty at eighty-two years of age, writes from his residence in Washington, D. C., as to the incitements which led his son to the invention of the telephone:

"In the boyhood of my three sons I took them to see the speaking machine of Herr Faber, and we were all greatly interested in it professionally. To test their theoretical knowledge, and their mechanical ingenuity, I offered a prize to the one who should produce the best results in imitation of speech by mechanical means. All, of course, set to work, but nothing of startling novelty was devised. The scheme of my second son, A. G. Bell, was, however, the best. This contest—as well as the whole course of the boys' education—directed their minds to the subject, until the sole survivor of the lads came to the conclusion that imitative mechanism might be dispensed with, and merely the vibrations of speech be transmitted to an electric wire. This was entirely his own idea. He illustrated it to me by diagrams, and sketched out the whole plan of central office communication, long before anything had been done for the practical realization of the idea. I can claim nothing in the telephone but the impulse which led to it."

Prospectors' Mistakes.

NUMBER II.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by "A PROSPECTOR."

Many prospectors, especially those in quest of free gold, overlook valuable claims by placing too much dependence upon the mortar and pan. While, as a general rule, ores in gold-bearing districts show some free gold, it does not follow that all the values lie in that portion that is obtained in the horn.

Ores containing silver values may at the same time contain enough gold that is not free, to justify terming them gold ores. Again there are a great many ores in which the gold, though practically free, is in such a fine state of division as to show not even a color by the horn test.

Some ores rich in gold would not be noticed by a regular prospector, for the reason that it has more the appearance of country rock than rock that would be supposed to carry gold.

Some of our richest mines have as gangue rock ordinary brown or iron-stained limestone. Some have as matrix nothing but common brown or iron-stained porphyry, which may be in the shape of small ledges a few feet in width or in large dykes or reefs 50 to 100 feet wide or even wider, still they carry gold values sufficient to make them good paying mines—in fact, almost any kind of rock may carry gold in profitable quantities.

Another class of mines that the prospector looking for gold would be very apt to pass by as beneath his notice are those of such magnitude that the very idea of their being worthy of investigation would be considered by him as preposterous. Large belts of schist containing numerous streaks and lenses of quartz, although apparently barren, may contain gold enough to make them veritable bonanzas. The gold may be free or the values may lie wholly, or nearly so, in small particles of sulphurets widely disseminated through the rock, both in the quartz and country rock or in either. The majority of the dividend-paying gold mines of to-day are just such propositions. They are to be sure mostly very low grade, but they are the kind of mines that capital is looking for.

There are also waiting to be discovered and opened base propositions that most prospectors consider as worthless simply because they are base.

If the prospector is of the free gold type he will not even know that they contain gold at all, but will let them lie and move on to some section where the ores are not base. If he happens instead to be a man who considers it worth while to have the ore assayed, he will know that the bases carry values high enough perhaps to make them profitable, providing they were free, but as the ore is base he passes on. Where the latter makes his mistake is in not considering the fact that in this age of machinery and improved appliances so-called base ores are made to pay a profit, whereas a few years ago were the same values in the shape of free gold they could not be handled at a profit.

It is well for a prospector, before starting out, to consider that a mine will pay:

First—Though small if rich enough, though of low grade if large enough. The exercise of a little judgment will enable him to determine the medium of the two extremes. He must leave a large margin in determining the relative limit in size and richness of his ore body. Better far to be prejudiced against the probability of his undertaking proving valuable, if he desires to be on the safe side.

Second—He should not rely upon a horn test, but consider that although a few assays will cost him a certain amount of money, it is nevertheless far cheaper to know definitely the value of his ore than to spend his time upon something it were better to let alone, or to leave something valuable and not know it to look for something better.

Third—Let him realize that if there is anything in his line of which he is ignorant and in doubt, in the matter of actual economic value of certain classes of ores, there are hundreds of men who can and will enlighten him if he will but inquire. There is hardly a question he could ask in relation to his business but that could be answered in the columns of the MINING AND SCIENTIFIC PRESS.

Fourth—In seeking to sell a prospect, or in trying to interest capital, he should by all means state the facts as he knows them and leave it to the investor to theorize and draw his own conclusions. No prospector ever yet aided his cause by misrepresenting anything in connection with his claim. No investor ever examined a claim which he found to have been willfully misrepresented, who did not go away disgusted.

Fifth, and perhaps not least, the prospector should not confine himself to hunting for quartz, but any kind of rock out of the ordinary, of which there appears to be less than a mountain, should be considered worthy of investigation, for the mine of the future will be one that has been overlooked, simply because it is different from the usual run of things.

Of Value to Miners Everywhere.

One of the latest instruments placed on the market by the Ericsson Telephone Co., No. 296 Broadway, New York City, is shown by the accompanying illustration, this being a combination instrument which can be used for either wall or desk. The magneto is without gravity hook and can be used for either long or short distance work.



The Ericsson Telephone.

When used on a desk the magneto is placed in the usual position under the desk, the same as when using an all-nickel desk set. In that case the combined transmitter and receiver (called hand microtelephone) can either be placed on the flat of the desk, in a pigeon hole, on the top of the desk or hung on the side of the desk, if desired, if more than one person is to use the instrument.

When used as a wall telephone, the hand microtelephone can be hung on an ordinary hook and placed at any convenient height, so that it can be taken down for use either by a child or grown person. The hand microtelephone is used by grasping the handle in the left hand, holding the receiver to the ear, which brings the transmitter at a proper distance from the mouth, the switch in the handle which is pressed by the fingers, making all the connections, and when released the instrument is cut out, the same as with a gravity hook such as is used in any ordinary telephone.

This instrument is growing in popularity on account of its utility and convenience, it being a most practical instrument for general purposes, and sold at a reasonable price.

The company also makes a variety of other styles for exchanges and will give particulars on application.

Horse Power Required for 20-Stamp Mill.

TO THE EDITOR:—Will you kindly give me the horse power required to run each of these 20-stamp mills?

First 20 stamps—1000-lb. stamps, 104 drops per minute; 12-ft. counter shaft pulley; 45-in. friction pulley; 6-ft. cam shaft pulley.

Second 20 stamps—1000-lb. stamps, 104 drops per minute; 14-ft. counter shaft pulley; 45-in. friction pulley; 6-ft. cam shaft pulley.

To give correct information in such cases requires complete data furnished by the inquirer. In the above case nothing is said about the other machinery of the mill nor is the height of the drop given.

The two mills would require practically the same power, the difference in the driven pulley being not of material import.

Assuming the height of drop to be 6 inches in both cases, therefore at 104 drops each 1000-lb. stamp would be raised 52 feet high per minute. Then: $\left(\frac{52 \times 1000 \times 20}{33{,}000} + 20\% \text{ for shafting and friction}\right) =$ 37.87, say 38 H. P. to drive each 20 stamps.

It is not to be understood, however, that that horse power would be sufficient to run all that is ordinarily meant by "a 20-stamp mill."

Efficiency of Air Compressors at Different Altitudes.

Following is a table of efficiencies of compressors when the air is so used at sixty pounds per square inch gauge pressure and at various heights above sea level:

Height in Feet above Sea Level.	Barometer. Inches.	Efficiency of Compressor, Per Cent.
0	30	100.0
500	29.42	98.4
1,000	28.85	96.9
1,500	28.34	95.5
2,000	27.78	94.0
3,000	26.74	91.1
4,000	25.70	88.1
5,000	24.73	85.9
6,000	23.83	82.8
7,000	22.93	80.2
8,000	22.04	77.5
9,000	21.22	75.1
10,000	20.43	72.7
12,000	18.92	68.0

MINING SUMMARY.

ALASKA.

C. Gustafson heads a company from Oakland, Cal., to dredge at Cape Nome.

The Alaska Copper Co., at Copper mountain, has seventeen claims 230 miles from Wrangel. Supt. Mellen expects to ship ore this summer.

Four miles from the Alaska Copper Co.'s property a New York company has several claims and is locally credited with intention to put 300 men at development work this summer.

ARIZONA.

S. A. Rank has been appointed Mgr. Union & Bonanza Tunnel Co., Chase gulch.

GILA COUNTY.

Times: At the Yo Tambien mine, Pinto district, G. Calder, Supt. Pinto M. & M. Co., has a 4½-foot ledge of 18% copper ore, carrying $11 in gold and nine ounces in silver. The company expects to erect a smelter shortly.

GRAHAM COUNTY.

At Safford the Copper Bell group of mines is bonded to R. G. Ruff for $75,000, he representing the Mount Turnbull M. Co.

MARICOPA COUNTY.

The Henrietta G. M. Co. has incorporated at Dover, Delaware, capital $1,000,000, to operate near Phœnix.

PIMA COUNTY.

The Austerlitz M. Co. has incorporated to develop the Austerlitz group of mines, Oro Blanco district.

YAVAPAI COUNTY.

The smelter of the Arizona Eastern & Montana Co. at Big Bug has started up again. C. W. Stickney is Supt.

The United Verde mine, Jerome, consists of about a dozen mining claims of uniform size, but of irregular platting. A local paper says that a sharp Prescott surveyor found, right in the heart of the mineralized portion of the property, that a small triangular piece (little more than 100 feet on a side) had been overlooked in patenting the surrounding claims. He promptly located the ground and commenced preparations for sinking a shaft; but the company, making the best of the situation, bought off the locator at once, paying him $6000 for his rights.

Jerome reports a gold discovery eight miles from there, on the United Verde Railroad, and miners are flocking there to the Clure-Weeden group, where the vein exposed is going down. Ore is being sacked at the Clure-Weeden claims for shipment, and five tons for a test will be shipped.

CALIFORNIA.

BUTTE COUNTY.

The Bader mine, near Magalia, has closed down temporarily. The mine is to be worked by ground sluicing.

CALAVERAS COUNTY.

W. W. Cook's new 10-stamp mill, Birdena quartz mine, Campo Seco district, is completed.

A San Francisco company has leased the Hannon, near Valley Spring, and will dredge the Calaveras river.

Prospect: The San Justo mine is expected to start up soon with Supt. Holmes. ——The board of directors of the Lightner mine will issue 10,000 more shares of stock, to be offered to the present shareholders pro rata at $1 per share.——The Union Copper M. Co. at Copperopolis is making extensive purchases of adjoining properties and negotiating for still other ground.

KERN COUNTY.

At the B. & S. D. M. Co.'s property the hydraulic syphon has unwatered the old workings successfully. A gasoline engine will now be used.

In the Kern river district eight wells are being pumped at the same time at the works of the West Shore Co. Walking beams with counter weights at each pump are operated by a line of wire rope running on pulley rollers on poles 50 feet apart. Part of the ropes terminate upon the periphery of a horizontal wheel borne upon a vertical shaft; part of them hook into an eccentric oval horizontally placed just below the wheel. The vertical shaft is revolved by cog gear. A wire rope runs from the eccentric wheel backward to a great counterbalance on one corner of a triangular walking beam. As the shaft revolves the cords all operate the weighted walking beams simultaneously, the counterbalance restores the lines taut, and eight wells are pumped under the supervision of three men—one to attend to the power and the others to watch the pumps and keep things in order.

LAKE COUNTY.

A. Rocca has sold his interest in the Great Western quicksilver mine, near Middletown, and will take up the American.

LOS ANGELES COUNTY.

The Oceanic Oil Co.'s well in Los Angeles has reached the deep oil sand at a depth of 1030 feet; there is a flow of oil. The drill is 20 feet in the sand.

The Soquel Canyon Oil Co. has begun operations near Fullerton.

Indications are reported promising in the well at Fullerton being drilled by the Fullerton Con. Oil Co. Oil has been struck on adjoining property of 32° gravity.

MARIPOSA COUNTY.

At the Mariposa Commercial & M. Co.'s Josephine and Pine Tree mines, Bear Valley, in the Josephine mine the management intends drifting 1000 feet on the vein, of which 400 feet has now been accomplished. Sixteen men are at work. The vein of the Pine Tree parallels the Josephine, and is being worked through a tunnel. There are twenty-five men at work.

At the Gold Bug mine, Kinsley, ore is being shipped to the Selby smelter in San Francisco.

The Merced G. M. Co. is pushing development work on the Mary Harrison. The 800-foot level has been reached.

The Columbus M. Co., four miles west of Coulterville, will construct a five-mile flume from Maxwell creek to the millsite. A fall of 1500 feet will be secured from where the flume reaches the top of the mountain to the mill below.

The Gazette reports in the Mary Harrison mine a shoot of ore south of the main shaft showing free gold. Sixty men are now employed by the company.

NEVADA COUNTY.

(Special Correspondence).—The enterprise of the Champion Con. M. Co., on Deer creek, is the most extensive in Nevada City district. About twenty-five claims have been consolidated, including such important properties as the Spanish, Wyoming and Merrifield. Recently the Nevada City has been added to the company's purchases. Some excellent ore is now being taken from the Merrifield shaft. As soon as systematic work can be done in the Nevada City, it is expected that property will yield good returns. Legal entanglements, now settled by the Champion purchase, have alone stood in the way of a profitable working of the mine for many years. The 5½x15-foot main incline at the Champion (see illustration on first page) is down to a depth of 2400 feet; at the Merrifield the 5x8-foot incline is down to a depth of 700 feet. Here a Cornish pump has lately been installed. It is run by a 10-foot Pelton water wheel, direct connected to the shaft carrying the pinion for the pump. Power at the Champion mill and hoists is derived from water under a vertical fall of 400 feet. The mill contains forty stamps and sixteen 4-foot concentrators. There is a chlorination plant of four-ton capacity, and an extensive sulphuret-saving plant is contemplated. Mill, hoists and grounds are lighted by electricity from the company's dynamo, which furnishes eighty-five incandescent lights of sixteen candle power. At the Spanish the incline shaft is down 800 feet. Here the hoist and pump, as well as a 10-stamp mill, are run by water. There are a 10-stamp mill and hoisting works at the Nevada City, but it is not probable they will be used, as the Nevada City ground can easily be reached by drifts from the Champion. About 160 men are now on the payroll of the Champion Co. Fred Zeitler is Supt., Henry B. Fuller foreman at the Spanish; Jno. Frederick foreman at the Champion, C. H. Weber millman.

The Providence mine, near Nevada City, on the opposite side of Deer creek from the Champion, is still a bullion producer after twenty-five years of checkered history and the production of more than $5,000,000 in wealth. The incline shaft is 2000 feet deep. The plant—a perfect one of its kind when installed several years ago—has not needed reconstruction, but runs smoothly at the present time. The reversible geared hoist of great strength and the Cornish pump are run by water. There is a fall of 350 feet here; 400 feet at the mill. The system of pumps, all attached to the same rod, consists of one 10-inch, four 8-inch and one 6-inch, stationed at various levels in the mine. There are steam attachments in reserve for pump and hoist. An air compressor, with cylinders 14x18 inches, is run by a 13-foot Tuthill water wheel, direct connected. In the mill the ore finds its way by gravity from the bins to the concentrators. There are forty stamps, with sixteen 4-foot vanners. A large drying room for the concentrates, elaborately glazed, has been built on the south side of the mill. Below the mill is an extensive sulphuret saver, run by a 2 H. P. electric motor, and owned by J. O. Wells, who pays a royalty to the Providence Co. The Providence chlorination works were destroyed by fire a few years ago and have never been rebuilt. Ordinarily the Providence Co. carries the names of 90 to 100 men on its payroll. Wm. McKinlay is Supt.; two of his sons act as assayer and machinist.

The Mountaineer mine, adjoining the Champion on the east, has taken on a new lease of life since November last. When the late superintendent was placed in charge, he made it a primary condition of his engagement that the company should place at his disposal several thousand dollars to be used in improving the mine and the equipment. He retimbered and repaired within the mine, entirely reconstructed the 20-stamp mill and added an extensive blanket plant. The value of the ore lies two-thirds in the sulphurets, one-third in free gold. The ground in the mine is very hard. An air compressor and five machine drills have been added. This will enable them to keep the twenty stamps supplied. The ledge in the Mountaineer is parallel to the Champion, and averages 18 inches in thickness. The mine is opened by a drain tunnel which runs 832 feet into the side hill. Here a station has been cut out, and the hoist is placed. The shaft goes down 1200 feet from this point, at an inclination of 38°. There are ten levels on the north side of the shaft and eight on the south, the drifts extending in one or two instances 800 to 1000 feet. The ore in each car is weighed and sampled as it is taken into the mill, and a record of the same is kept, thus enabling the management to know which part of the mine is yielding best returns. Water under a vertical fall of 320 feet is the main power employed, and will continue to be used at hoist and Cornish pump; but a 160 H. P. electric motor now supplies power to run the air compressor, and the same power will be drawn upon for the mill. Besides a rock breaker, which has also been added of late, there are twenty stamps in the mill and eight concentrators. A hydraulic pump elevates the tailings before the same are projected upon the slime tables. About seventy men are employed.

The Phœnix mine, southeast of Nevada City, which started operations about three years ago as successor to the old Sneath & Clay, is working along in a modest style. The old shaft, 500 feet deep, has been increased in depth only 100 feet since being cleaned out and partially retimbered. A north drift is being driven on the lowest level at the present time. The ledge is not a large one, but is rich in spots, and the ten stamps in the mill can crush during the day all the ore which both day and night shifts of four men each take from the mine. The ore is heavily mineralized and should be smelted to get best results. The single-reel friction hoist, the Cornish pump and the mill are all run by water, which is brought to the mine through 4500 feet of pipe, giving a vertical fall of 500 feet. The expense for power does not exceed $2 per day. A small water wheel runs an electric dynamo for lights. Cincinnati people are stockholders in this mine. David Hutchison is Supt.

The Mayflower mine is east of Nevada City, on Canada hill. Besides several different ledges, the company owns a gravel claim, which was worked as a hydraulic proposition until enjoined by the courts. This part of the property may yet be opened as a drift mine. There is now a tunnel of 2200 feet leading toward the channel. The ledge of ore which is now being worked through the 700-foot incline shaft is from 8 to 10 inches in thickness. Enough ore is obtained to keep one-half of the 20-stamp mill in operation; the ore is from 2% to 2½% sulphurets. The lighter sulphurets are saved on a blanket plant. Hoist, pump and mill are run by water taken from the South Yuba ditch and brought to the mine under 320 feet vertical fall. The hoist is a strong, double-reel, geared machine. The mill contains four concentrators. The owners, Messrs. Martin Bros., Jno. Waters and Jno. H. Richards, all of Nevada City, are constantly developing their property.

The Home mine, adjoining the Providence, on Deer creek, has its incline shaft down 400 feet. They have a good property on a paying basis. Enough ore is being taken out to keep the adjoining 10-stamp mill busy (leased of the Cadmus). Three power drills are kept continually at work in drifts and stopes. Water under 200 feet pressure is utilized for power at the hoist and pump. L. J. Rose, Jr., representing the estate of the late L. J. Rose, controlling stockholder, has recently visited the property, and, after consultation with Supt. D. J. McFall, it has been decided to construct at an early date a 20-stamp mill and a compressor plant. This will make the Home one of the leading mines of the district.

The Cadmus mine adjoins the Home on the south. The shaft is down 500 feet. Water is the power used, under a fall of 200 feet at the hoist and 260 feet at the mill, which is modern in equipment and well planned. There are ten stamps and two concentrators. A 5-foot wheel runs the hoist, another 5-foot wheel is used for the pump and a 9-foot wheel for the compressor. San Francisco and Stockton business men are the principal stockholders. Chas. Kahl is Supt.

It is probable that the entire plant at the Reward mine, one mile from Nevada City, will soon be remodeled. Up to the present time steam has been the motive power. It is proposed to substitute electricity or water, and a decision will be reached at the directors' meeting on the 5th of April. The heavy friction hoist and the Cornish pump will be put on cement foundations, the same to replace the partially decayed timbers now serving that purpose. The 2-stamp, triple-discharge battery will be added to by two more of the same kind and the property changed from a developing prospect to a working mine. The shaft is now down 1000 feet, and there is a good 6-inch ledge. A 6-inch pump at the 1000 level and an 8-inch at the 700 level raise the water in the mine to a drain tunnel at the 400 level leading to Deer creek. R. C. Walrath, one of the owners, is Gen. Mgr.; J. T. Gribble Supt.

The California Con., embracing the California and the Gold Tunnel claims, adjoins the Reward on the north, and is owned by A. D. Allan, the Nevada City foundryman. Twenty tons of ore recently taken out by tributers, and crushed at the Nevada City custom mill, yielded excellent returns. The development is limited to several drifts running out from a 400-foot incline shaft, which extends to a drain tunnel. A small steam hoist is the only machine equipment. Harry and Van Carrow and Stephen Roberts are working the south portion of the mine on a lease.

That famous old property, the Pittsburg, south of Nevada City, is kept open by its principal owner, Sam'l Granger of Grass Valley, and, with tributers, a force of forty men is now employed here. Fifteen are engaged at day's pay. Work is going on at various levels from 200 down to 800 feet. From that depth to the bottom of the shaft (1000 feet) the mine has not yet been unwatered since filling up during the winter. The hoist, pump and 10-stamp mill are run by water. A. A. Charonnat runs the hoist and superintends operations.

The Texas mine in Willow valley, northeast of Nevada City, is exceptionally complete in equipment. It has separate water wheels for its hoist, pump and air compressor, and has in reserve a steam plant with which to run any of these machines, should accident occur to the water supply. Besides the Cornish pump, there is a steam pump at the 200 level in the mine to assist the larger machine when the water becomes troublesome. The hoist is a single-reel, friction machine. The shaft is vertical and is 250 feet deep. Ore is being taken from the 160 and 250 levels, the vein being from 2 to 6 feet thick; it is 2% sulphurets. There are four parallel veins in the property. The 10-stamp mill, run by water under a vertical fall of 250 feet, is so constructed that ten additional stamps can be added without enlarging the building. Below the stamps are two 6-foot concentrators, and in an adjoining room a three-ton cyanide plant has been in operation for some time with good results. J. Korbel, president of the company, is now examining the operations of the mine; Wm. Fisher is millman; Percy Watters engineer. About fifteen men are employed.

The Buckeye is one of the promising leads in Willow valley. It is in slate, parallel to and adjoining the contact with granite. The formation resembles that at the Champion and Providence. About thirty years ago 300 tons of ore were taken out and worked, yielding from $7 to $100 per ton. In places rich specimen ore was found. The present owners, being unable to put up machinery, are driving a tunnel to tap the main lead at a depth of 100 feet. This tunnel is now following a small vein of good ore, and has about 200 feet to run before reaching the main ledge. T. B. Gray is principal owner.

Willow valley seems to be a coming district, and greater activity is being displayed here than elsewhere. Within the past week the Franklin mine, formerly owned by M. Hussey, has been bonded to E. D. Boyle, who has resigned the superintendency of the Alta mine, Gold Hill, Nevada, to take up work on his new enterprise. He has contracted for 2000 feet water pipe to bring water from the South Yuba ditch. A fall of 275 feet, vertical, will be obtained. A prospecting hoist will be procured at once, the present shaft will be sunk deeper and the four ledges existing in the property will be thoroughly developed.

The La Belle and the McKinley, two locations in Willow valley, are to be developed under the superintendency of J. L. Postlethwaite. Considerable work has been done on these claims in the way

of tunnels, drifts and raises. Mr. Postlethwaite will continue an east drift to the contact, where it is expected an ore body will be opened. The parties now in control stand ready to erect a 10-stamp mill and an air compressor plant, the latter to be utilized in running power drills in the mine.

The Lecompton mine, Willow valley, owned by J. J. Ott, has been producing some excellent ore of late by lessees and tributers, who pay 10%. The ledge is heavily mineralized. Portions which were assorted and sent to Selby's, to be smelted, returned $354 per ton; considerable ore has been put through Locklin's mill, which yielded $82 per ton in free gold, exclusive of sulphurets. The Lecompton has not been extensively developed.

The Montana mine, Willow valley, three miles from Nevada City, has recently been sold to the Anglo-Swiss Bank of San Francisco. A pipe line one and one-half miles long will be laid, so that the new machinery for hoist, pump and compressor may be run by water. The old two-compartment shaft, 300 feet deep, will be carried down 500 feet farther and the mine otherwise developed.

The old Banner mine, owned by Mrs. Huntington, formerly proprietor of the Nevada City Water Works, has been bonded by San Francisco and Stockton men, with F. M. Manson, formerly of Sierra county, as Supt. This property paid well in former years. There is a good, strong 8-foot ledge, well mineralized but somewhat rebellious. The new company has begun operations preparatory to the putting in of a hoist, pump, etc. It is probable that Wm. Floyd of Nevada City, former foreman of the mine, will be called to his old position. The bond runs for two years.

The Charonnat is another old mine near Nevada City, which will be opened during the coming summer. A company of Eastern capitalists has made arrangements with Geo. C. Gaylord to take hold of the property. They will repair the hoist and put in a pump and other machinery. The old shaft is 1300 feet deep. Fully $600,000 was taken out of the mine, under old methods, before it was shut down.

The Pioneer Reduction Co. have their works on the Grass Valley road, less than a mile west of Nevada City. Through the adoption of approved modern features, and by intelligent management, they have increased business. Besides the old-time chlorination plant, they have a matte furnace, smelter and a pulverizer. The furnace is heated by crude petroleum. In the same building, and auxiliary to the matte furnace, is an automatic roaster, in which the sulphurets are automatically fed into the furnace and kept agitated, as well as moved slowly forward, by a series of shovels arranged upon an endless chain. The capacity of this furnace and the smelter is fifteen tons per day; of the chlorination plant five tons per day. The tailings of the old chlorination plant, which contain copper and other metals not previously extracted, are run through the matte furnace with fresh sulphurets and selected ores. Benj. Hall is Pres. and Gen. Mgr.; J. H. English, Sec.; Wm. Black, Vice-Pres.; D. E. Morgan, Treas.

Locklin's custom mill for reduction of ores, on Deer creek, in the edge of Willow valley, is kept constantly at work, mostly on the product obtained by tributers in the contiguous territory.

The Martin-Muir Co., Nevada City, have finished a second 10-stamp battery for the Mountaineer mine. Martin Bros. and David Muir are proprietors.

Nevada City, March 25. H. G. P.

PLACER COUNTY.

Sentinel: The Bellevue Con. M. Co. have put in a new 36-foot wheel to run their new hoist at their mine near Ophir. Spurgeon Bartlett is Supt.——Supt. Eastwood of the Hathaway mine, near Ophir, is placing the new 20-stamp mill and machinery.

PLUMAS COUNTY.

W. E. Duncan Sr., C. E. Ertz and Hallsted Bros. have given a working bond on the Duncan and Hallsted quartz mines, Rich Gulch, to men who will develop the properties.

SAN BERNARDINO COUNTY.

J. B. Lane is now Supt. of the Barstow mill, which is running on ore from Randsburg. H. Meade is superintending the cyanide plant at Barstow.

SAN DIEGO COUNTY.

Dr. Stanley has bought the tailings at the Shenandoah mine at Mesa Grande, and will move his cyanide plant there from Banner.

SHASTA COUNTY.

Supt. Shepard has a 6-foot ledge of sulphuret ore in a drift from the new 200-foot shaft of the old Spanish mine.

The National Con. M. Co. has levied an assessment of 5 cents per share, delinquent May 1st.

SISKIYOU COUNTY.

(Special Correspondence).—H. Mattern and associates of Ashland have bought J. L. Coyl's Tannina mine, an extension of Jillson's mine, thus making about fifteen claims this company has acquired in this section.

The 10-stamp mill on the old Sterling mine was started last week. They have struck rich rock and are going to put in twenty stamps this summer. The Sterling Co. bought the Pitchin, an extension, from C. R. Wiegel.

J. Downing, on Ash creek, has some more rich specimen rock on the Little Beryl, where a $10,000 pocket was taken out four years ago.

The Jillson mine, near Henley, continues paying handsomely. Ten stamps more will be added this summer.

Hornbrook, April 5.

Journal: A Chicago company will build a steam dredger on McAdams creek.——The Jillson & Roberts quartz mine, near Hornbrook, is paying. Sixty men keep the mill running constantly.——The Portland company is building a ditch five miles long to the Poverty Point mine at Oak Bar.

TUOLUMNE COUNTY.

Big Oak M. Co. has incorporated at Fresno, with $100,000 authorized and $500 subscribed capital, to succeed the Tuolumne Mother Lode Co.

Independent: E. C. Holmes, Supt. Mohican M. Co., has a bond on the Florida, near Carters.——The mill at the Providence is hung up and a portion of the underground force laid off, pending the result of water rights litigation.——W. W. Robinson has secured a bond on the Wheal-Perrin and will have the mine worked.——The strike made in the Grizzly continues richer than ever. It was made at the 700, where the vein shows 10 feet of solid quartz between walls.

TRINITY COUNTY.

Supt. Dobler of the Brown Bear, Deadwood, has a tunnel in over 3100 feet; the ledge was cut at a distance of nearly 3000 feet. The new mill will soon be begun.

COLORADO.

BOULDER COUNTY.

At Boulder the Atlas Reduction Co., formerly the Delano chlorination mill, is superintended by C. D. Grove and is in operation.

CLEAR CREEK COUNTY.

A. T. Chapman, S. D. C. Hays and E. S. Ball constitute the Mount Wright M. & D. Co., capital stock $50,000, to operate in this county.

Georgetown reports a strike in the Scepter mine of the Astor group, going 417.71 ounces gold, 31% lead and sixty-nine ounces silver per ton.

Supt. Arnold of the Doric has resumed work. The machinery has been overhauled, a fan put in and 2400 feet of track relaid.

Near Idaho Springs, for the Seaton Co., Mgr. May is driving the Foxhall tunnel, drifting on the Seaton vein and working on the vein in the Newhouse tunnel, 2000 feet below the surface workings.

The Crown Point mine is moving ore to the Wilkie mill and treating the product under rapid-drop stamps. The mine has wide bodies of iron sulphide ore in all parts of the lower levels, which, when concentrated, is in demand at the smelters.

Georgetown Courier: One of the best finds ever met with in the Centennial mine was made this week in the third level east. The level had been passing through a fault for some distance, when suddenly an 18-inch vein of solid ore was opened up. A test run was made, showing it to carry 16 ounces silver and 3.3 ounces gold to the ton and about 5% copper.

DOLORES COUNTY.

The Colorado C. & M. Co. is shipping concentrates to Durango. Shipments of iron ore to the Durango smelter are on the increase.

FREMONT COUNTY.

In the Montana tunnel, east of Dawson, assays show, in a body of hematite 18 inches thick, $36 in gold.

At Florence the old Beam mill is being renovated and will resume operations.

GILPIN COUNTY.

In the tunnel, Geiger mine, Pine creek, an ore streak has been cut showing values of $128 a ton in gold.

The California mine is hoisting water from below the 1700-foot level.

Three miles of placer ground on North Clear creek, below Black Hawk, have been bought by the Gold Coin Placer Co., who intend working the whole of the creek bed. A flume will be built, track placer machines used, and derricks with steel buckets will scrape up the dirt and dump it in the flume. Work will commence at the lower end of the property and bedrock will be followed the whole distance.

GUNNISON COUNTY.

The Midland mine at Vulcan has a body of ore running four to five ounces gold, and when the drift is started at the 225-foot level it will have 1000 tons ready for stoping.

The Black Copper mine, south of Vulcan, will be operated this season. The vein has been opened for 4500 feet, showing copper values the entire way.

LAKE COUNTY.

The Ruby mine, California gulch slope of Iron hill, is yielding lead-iron sulphides, 1000 tons of ore per month. The Miner says returns from the settling assays show 18% lead, 28% iron excess with 13% zinc, and the bimetallic values show 10 ounces silver and 0.1 ounce gold.

The Home M. Co. at Leadville is now raising a larger amount of ore than at any previous time since the big strike, averaging for March about 450 tons. The Herald-Democrat says that during February the net smelter returns did not reach over $5, but lately there has been a decided improvement, and now the net values are nearly twice that sum.

The Montgomery shaft of the La Plata, worked under lease, recently entered a fine body of carbonate ore, which averages over 20% lead and runs quite high in silver.

Miner: The Excelsior Gold Mines Co., owning fifteen claims near Frisco, including the Excelsior mine, have started up their mill and are treating about fifty tons of raw ore per day. The ore is a copper-iron sulphide carrying values of $4 to $80 per ton in gold, 4% to 10% copper and a small amount of silver. The mine and mill are under the management of A. B. Ogden. The company has spent $150,000 in development and construction of mill and electric plant. The latter is on North Ten-mile creek, one mile above the tunnel and mill, and generates from the water of that creek 150 H. P. Work has been in progress at the mine for some time, a four-drill compressor being used, and a large amount of ore is now awaiting concentration by the mill. Much of the ore is of a smelting grade, but at the present time all of it is run through the mill. On the mine and mill twenty-five men are employed.

Chronicle: Leadville has found a new outlet for its iron ore. The smelters of Colorado are filled to overflowing, and for some time past the American S. & R. Co. has been directing a portion of the product to Utah. At present about 125 tons per day of Midas iron are going to the Germania plant of the American Co. at Salt Lake City. Over ten years ago a considerable quantity of oxidized Leadville iron was shipped to Utah, but in 1888 the movement of ore westward ceased, and it has not been resumed until recently.

MINERAL COUNTY.

The Amethyst is now shipping from the ninth level, which had been under water. There the gold values commenced.

Pres. Harvey of the Home M. Co., Leadville, has bought an interest in the Sulphide group and will develop it.

OURAY COUNTY.

Ironton, at the foot of Red mountain, reports two strikes. At the Mono an upraise cut a 12-foot vein of copper and silver ore, running $60 per ton; at the Guadaloupe, copper-silver ore, worth $75 per ton, the vein is 10 feet wide.

SAGUACHE COUNTY.

(Special Correspondence).—Philadelphia parties who purchased the Spanish grant, near here, are to erect a 100-stamp mill on the Independence mine.

Creston, March 31.

(Special Correspondence).—Philadelphia and Providence people are erecting a fifty-ton concentrator on the San Isabel mine at this place, in the Sangre de Christo range, twelve miles east of Moffat station in the San Luis valley. The plant will include an air compressor and a surface tramway 4000 feet long. The machinery for the concentrator is being furnished by the Mine & Smelter Supply Co. of Denver, and will include crushers, rolls and Wilfley tables. E. G. Granville is manager of the property.

San Isabel, March 31.

SAN JUAN COUNTY.

The Gold Bug and Repeal mines, Bear creek, have begun breaking down carload lots of the sylvanite and petzite ores, opened last summer.

SUMMIT COUNTY.

Kokomo now finds it impossible to secure enough cars to carry the ore which is being produced.

At Blue River valley the Oro Grande M. Co. has ten miles of placer ground, from Breckenridge to Dillon, and is using the Evans hydraulic elevator system for removing gravel and raising the pay dirt. The water is brought down from the penstock in a 30-inch pipe, split into several nozzles at the lower end. These play against the gravel bank, and by two other 2-inch nozzles playing into a 20-inch pipe running from the bottom of the pit up into a large 4-foot flume, the sand, gravel and smaller rocks are carried up into the flume, where the lighter gold is caught in the riffles, as in ordinary ground sluicing. The water in this flume is the same as that used for breaking down the gravel, an 8-inch pipe extending up alongside the larger pipe, taking the water out of the pit as rapidly as it enters by a similar method to that used in elevating the dirt. The larger rocks are raised by an electric elevator, the electric power being generated by the fall from the penstock to the bottom of the gulch. The lower portion of the gravel and the bedrock seams will be worked out by hand and run through a bedrock flume in the bottom of the pits.

TELLER COUNTY.

At Cripple Creek the Sitting Bull group has been bought by the Gould Co. for $75,000.

The Gillett reduction mill has begun shipping gold.

The Independence T. & M. Co. is daily putting out twenty-five tons of $70 ore.

Cripple Creek hears that C. C. Chapin will be able to push the Ophelia tunnel enterprise, by eight-hour shifts and modern drills through Gold and other hills, to its objective at Victor, a total distance of about three miles from its mouth near the city of Cripple Creek. It has now reached a distance of 4000 feet. There is a fine equipment of machinery.

The Strong mine closes for sixty days April 10, to install new machinery.

The Ajax, on Battle mountain, quits for thirty days while new engines and boilers are put in.

There is a local rumor that the Portland closes on April 10 for sixty days during the overhauling of its boilers.

It is understood that the real reason for cessation of work in these mines is the growing difficulty in mutually satisfactory arrangement of terms with the smelter trust.

The Cripple Creek Star, commenting upon the matter of the mill and smelter charges, says a ton of $30 ore now costs $9 for treatment, $1 for sampling, $3 for freight, and the mills pay only $19 an ounce for gold. This makes the charges $14 on $30 ore.

Post: The Creston Leasing Co., that for the last two and a half years has been digging in the Jack Pot ground, is about ready to quit operations for good. The lease has produced ore worth nearly $1,000,000, and the profit to the company, after royalties and other expenses have been paid, is a trifle over $400,000. Before the end of the week the Creston people will haul away their machinery and make their last shipment. They have taken a lease on the Hiawatha claim for the Monarch Co., where the machinery will be planted, and where they hope to meet with better success than has attended their late working of the Jack Pot.

Post: The Mary McKinney has reserves blocked out for extraction, but is shipping only twenty-five to thirty tons a day, yielding an average of $70 per ton. At the 400-foot level the ore shoot has been proved up for 1600 feet; the vein averages about 4 feet in width.——The Isabella is said to have cut the high-grade chute in the eleventh level, and that good ore is being followed on the old Buena Vista vein in the twelfth.——The Moon-Anchor will send out 100 tons carrying from two to three ounces. The output is about 560 tons per month.

IDAHO.

KOOTENAI COUNTY.

The Blue Bird mine on Lake Pend d'Oreille, near Lake View, reports $1506 net on a carload of ore. There were four lots upon which the smelter returns were respectively 196 ounces, 70 ounces, 164 ounces and 42 ounces of silver.

WASHINGTON COUNTY.

The Thunder Mountain Consolidated Gold Mines, Limited, capital stock 30,000,000 shares, has organized at Weiser to work the Thunder Mountain properties.

MICHIGAN.

J. Reed, for the Trimountain Co., will sink a permanent incline shaft at No. 2 shaft, where there is a vertical depth of 106 feet sand above ledge, thought to be the deepest shaft ever sunk without resorting to ammonia freezing process.

The Calumet & Hecla propose to establish a large foundry at Calumet for their own use. The mine now employs about 200 skilled mechanics at its machine and blacksmith shops.

MONTANA.

BEAVERHEAD COUNTY.

With the exception of the Bon Accord, all of the dredgers in the county are being put in readiness for the season's work.

SILVER BOW COUNTY.

The annual report of the Alice M. Co., at Walkerville, shows that the total re-

ceipts of the company for the previous year were $495,285.01, of which $354,371.12 was derived from the sale of bullion, $138,555.73 from the sale of ore, and the remainder from miscellaneous sources. The disbursements totaled $512,561.15—$17,276.14 in excess of the receipts. Of this amount, $86,079.13 was expended for labor and $106,840.08 for ore reduction. The superintendent's report shows that in the company's property are bodies of sulphide ore, for the successful treatment of which the management has been endeavoring to find a process.

The Montana Ore Purchasing Co. has begun suit against the Boston & Montana Co. to recover a judgment for $2,172,500, for alleged interference with the working of the Johnstown mining claim for eleven months.

NEVADA.

ESMERALDA COUNTY.

Eighty miles northeast of Candelaria, J. Farren says, ore has been found that shows 4000 ounces silver, 40% lead and $38 gold per ton.

WHITE PINE COUNTY.

At the Homestake mine at Hamilton sixteen men are at work. Five teams are hauling ore to Eureka for shipment over the E. & P. railroad.

NEW MEXICO.

GRANT COUNTY.

At Silver City the Graham Co. is working a force of fifty-six men in the Confidence mine. At Mogollon the Last Chance has twelve men at work in the mine and sixteen in the mill; Deep Down mine, twelve men; Little Fannie mine, thirty-two men; and the Cooney mine, twenty-three men in the mine and nine at the concentrators. The latter is shipping five and one-half tons of concentrates daily.

The reported sale of the Silver City Smelting Works to the El Paso smelting trust will not close that plant. Operations were suspended for two weeks to install new boilers.

OREGON.

BAKER COUNTY.

At the Alamo G. M. Co., Supt. Mahoney says the average assays taken at the bottom of the winze gave $17.23.

A strike is reported in the Weatherby-Bonanza mine, twenty miles southeast of Baker City, a ledge nearly 3 feet wide carrying free gold.

LANE COUNTY.

The Black Butte quicksilver mine has bought the Eugene street railway rolling stock for tramway use.

UTAH.

Dividends from the Utah mines for the first three months of 1900 aggregated $667,300; there were paid in March, $240,000.

TOOELE COUNTY.

The Peyton option on the lands of the Sunshine M. Co., at Sunshine, has been abandoned.

WYOMING.

CARBON COUNTY.

(Special Correspondence).—The property of the Kurtz-Chatterton Copper M. Co. is being developed by a tunnel 1380 feet long, which crosscuts several veins—one at 700 feet and another at 1200 feet from the tunnel entrance. Drifts are being run on the two principal veins crosscut and the tunnel is being pushed to cut a larger ledge which outcrops at the surface. One vein is 4½ feet and the other 9 feet wide, samples from which are reported as running from $14 to $20 per ton in copper values and from $1.20 to $4 in gold.

Arrangements have been made to erect a 60-ton concentration mill on the property, the construction to be in charge of B. W. Sweet. Messrs. Adams, Knapp & Hinckley are directing the affairs of the Kurtz-Chatterton C. M. Co.

Grand Encampment, March 28.

FOREIGN.

BRITISH COLUMBIA.

The strike in the mines of Nelson district has ended. The mines in Nelson and Ymir districts will pay uniform wages of $3.25 a day.

At Grand Forks in the Gold Drop an upraise 200 feet to the surface is in progress.

The main tunnel in the Rawhide is now in 500 feet.

The wooden superstructure of the dam across the Kettle river for the Grand Forks smelter is being constructed.

About 100 men who were employed at the Granite, Royal Canadian and Poorman mines have quit work and the mines are closed down, says the Nelson Miner. The men came out by order of the union, owing to the fact that the mine owners refused to comply with their demand for higher wages. Several days ago a deputation of twenty-five men came in to see Captain Duncan, and made a proposition to the owners to pay an increased wage. They demanded $3 a day for muckers and laborers, with a reduction of $1 from the amount they were charged per week for board. They were receiving $2.50 per day and paying $5.50 per week for board. Wednesday morning Captain Duncan visited the mines and informed the men that their demand would not be granted, whereupon, under the ruling of the union, they refused to work any longer and the mines closed down. Captain Duncan has cabled a full account of the proceedings to the London office and is awaiting instructions from there.

INDIA.

The Mysore G. M. Co., Ltd., produced gold during January to the amount of £56,916 8s 1d.

MEXICO.

The Sonora Quartz Mine Development Co. of California, of which R. G. Hart is Mgr., is working the El Tiro and Yaqui mines, Altar district, Sonora. F. L. Coombs of San Francisco is president and S. J. Hendy vice-president.

The original Cobre Grande M. Co. is in possession of the Cananea copper mines, northern Sonora. J. H. Wood is receiver.

The new smelter of the Las Animas M. & S. Co., in the Altar district of the State of Sonora, will begin this month. A fifty-ton stack is nearing completion.

Chihuahua Enterprise: The Sonora Development Co., operating the Arbabo mine near Torres, Sonora, are taking out ore averaging 1800 ounces.

SOUTH AFRICA.

A London Times South African correspondent hears that all the Rand mines have closed down and that British workmen and their countrymen in other parts of the Republic are being expelled wholesale from the Transvaal.

SOUTH AMERICA.

Platinum is reported in veins of manganese ore existing in altered or decomposed syenites near Santa Rosa de Osos, in Colombia.

SPAIN.

The dividend of 45 shillings per £5 share declared by Rio Tinto Co. on its 325,000 ordinary shares amounts to $3,656,250, the largest ever declared by that company. The previous dividend upon Rio Tinto ordinary shares was 35s per share, paid Nov. 1, 1899. These two dividends upon the Rio Tinto ordinary shares aggregate $6,500,000. For 1898 the Rio Tinto earned $6,000,000, or just about Boston & Montana earnings for 1899. About the same amount was also earned in 1897. The dividends paid out each year amounted to $4,250,000, which was 5% on 325,000 £5 preference shares and 47½% on an equal number of ordinary £5 shares. The last two dividends on the ordinary shares have aggregated 80 shillings per £5 share, or $20 per share on 325,000 shares, a total of $7,500,000, which ranks the Rio Tinto very close to the Calumet & Hecla dividends.

Personal.

GEO. J. HOFFMAN, a California mining engineer, has gone to London.

A. C. PAUL has returned from Shasta county, Cal., to San Francisco.

B. F. BUSH succeeds J. M. Fox as Mgr. Rocky Fork, Mont., coal mines.

JAMES DOUGLASS, Pres. United Globe mines, is at Globe, Gila county, Ariz.

O. P. POSEY, Gen. Mgr. Bingham Copper & Gold M. Co., is visiting San Francisco.

R. C. SURBRIDGE, Pres. Fortuna-La Republica M. Co., is in California from Boston.

THOMAS WILLIAMS of San Jose is the new Supt. Mountaineer mine, Nevada county, Cal.

BEN WILLIAMS, late Supt. Copper Queen, Ariz., has returned to San Francisco from Placerville, Cal.

A. J. WALSH goes to the island of Java to report on a mining property for the Risdon Iron Works of San Francisco.

J. H. AND W. B. DEVEREUX are examining the U. S. M. Co.'s property at Bingham, Utah. The latter is now in the directorate of the Melones, Cal., M. Co.

STATE ATTORNEY-GENERAL FORD AND EX-CONGRESSMAN CAMINETTI are in Washington, D. C., in the interests of the work of building debris restraining barriers in California.

C. J. JENNE, formerly with the Mountaineer mine, Nevada City, Cal., goes to take charge of the machine shop and electrical department of the Victor mine, Brown's Valley, Yuba county, Cal.

Industrial Notes.

—A railroad is to be built from Thornton to Bland, N. M.

—The Santa Fe road is built from Bakersfield, Cal., to San Francisco bay.

—The survey of the Central Arizona railroad has been completed from Flagstaff to Globe, 147 miles.

—Work has begun on the A. & U. extension north from Chloride, Arizona, toward the Colorado river. Camps have already been established.

—The gross earnings of the Canadian Pacific Ry. for the year 1899 were $29,230,038.26; working expenses, $16,999,872.77; net earnings, $12,230,165.49.

—At Pittsburg the price of coal advanced from 25% to 50% on the 1st. The advance is attributed to the increased wages of the miners, and the coal famine in the East and in Europe. Operators can hardly fill orders.

—Hundreds of unskilled Italian laborers are reported at the mining towns of Minnesota, employed at surface mine labor at $2 a day. Such has been the increase of wages that the cost of stripping earth at these mines has been increased to 45 cents a yard.

—The contract for building the Southwestern railroad system in the State of Ycata, Yucatan, has been let to Porfirio Diaz, Jr., son of President Diaz; he will put 3000 men to work constructing the line as soon as the Government approves the plans.

—Alabama has sold England 2,000,000 tons coal, for $1.50 per ton, delivered at New Orleans. Coal in Germany has advanced 40% within a year; the Welsh collieries can no longer supply European navies. Nagasaki, Japan, is importing coal from Virginia.

—The General Electric Co. of New York has secured control of the Siemens-Halske Electric Co., the stock of the latter corporation having been bought by the individual stockholders in the General Electric. The Siemens-Halske Co. will be conducted independently for a time, but eventually will be merged into the General Electric corporation.

—Ex-Senator Warner Miller has been in Phœnix, Arizona, looking up, on behalf of New York clients, the capabilities of the Salt river valley and the cities of Phœnix, Tempe and Mesa for financial support for a great water storage dam, to be built in the canyon of Salt river, sixty-five miles east of Phœnix, where the stream is joined by the waters of Tonto creek. It is understood he will recommend the investment of the necessary capital, approximating $2,000,000.

—San Francisco is considering a proposition made by Von Schmidt, Dillman & Hunt to bring into San Francisco, at a cost of $25,000,000 to be paid by the city, a supply of 60,000,000 gallons per day of fresh mountain water drawn from Lake Tahoe, lying on the eastern slope of the Sierras: a restraining dam to be constructed across the Truckee river, a diverting canal built to a point several miles below the dam and a tunnel run under the summit of the mountain range, to deliver the water at a point on the American river, where a reservoir would be constructed, from which the water would be conducted in steel pipes to San Francisco.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ROCK DRILL.—Russell Avery, Sausalito, Cal., one-half assigned to H. C. Campbell, San Francisco, Cal. No. 646,343. Dated March 27, 1900. This invention relates to improvements in apparatus for drilling rock and the like. It consists in means for maintaining the drill at any desired angle, and providing for means for moving it transversely, and returning it without disturbing the angle, and means for connecting the drill with the striker, so that the movement of striking the drill serves to rotate and raise it intermediate of each stroke. The object of this is to enable the hammer wielder to turn the drill without the assistance of a second man, as is shown in hand drilling, and by this connection each backward swing of the body in raising the hammer will pull upon the cord and by the connection will turn the drill.

NUT LOCK.—J. W. Stanley, Yuba City, Cal., one-half assigned to J. W. Ashley, same place. No. 646,059. Dated March 27, 1900. This invention relates to a device for locking nuts after they have been screwed upon bolts, so as to prevent their jarring or otherwise turning loose upon the bolt. It consists of a plate having holes made through it to receive the bolt, and slots cut in the ends of the plate parallel with each other and with the side edges, and forming a plurality of independent tongues which are adapted to be turned up against the sides of the nut. Similar slots are made at any point within the length of the plate so that when a nut has been put upon a bolt at such point, the edges of the strips cut away by the slots can be turned up against the sides of the nut to prevent its turning. By turning the flaps down the nut can be turned to either release it, or turn it further upon the bolt, and the flaps again turned up.

SOOT DISPERSING ATTACHMENT FOR BURNERS.—J. C. Lohmeyer, San Francisco, Cal. No. 646,054. Dated March 27, 1900. This device is intended to prevent the blackening of ceilings by smoke or soot produced from lamps, gas or other burners. In the use of lighting appliances, a great difficulty arises from the gradual deposit of soot at points upon the ceiling above the burner. This apparatus consists of a wheel having angularly placed vanes, and means for turnably suspending it above the burner so that the rising heat will cause it to rotate in a horizontal plane, and its rotation in this manner serves to disperse the soot, and cause it to pass off above the line of the upwardly moving heat, and being out of this line, it will drop harmlessly to the floor, and will not reach the ceiling.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING MARCH 27, 1900.

646,161.—BICYCLES—J. D. Atkinson, Seattle, Wash.
646,343.—ROCK DRILL—R. Avery, Sausalito, Cal.
646,262.—WOOD PLANE—H. M. Coe, Phœnix, A. T.
646,090.—GAS BURNER—J. P. Farmer, Portland, Ogn.
646,049.—ELEVATOR—E. M. Fraser, S. F.
646,385.—HYDROCARBON BURNER—M.O. Godding, Monrovia, Cal.
646,386.—HYDROCARBON BURNER—M.O. Godding, Monrovia, Cal.
646,054.—SOOT DISPERSER—J. C. Lohmeyer, S. F.
646,004.—SEEDER—A. J. Malsbary, Stockton, Cal.
646,030.—AIR COMPRESSOR—J. D. McKinnon, Portland, Ogn.
646,031.—AIR COMPRESSOR—J. D. McKinnon, Portland, Ogn.
646,095.—TRACE EYE GUARD—W. P. Murphy, San Jose, Cal.
646,233.—DOOR LOCK—A. Newell, Pasadena, Cal.
646,098.—LEVEL—M. Nilson, Oakland, Cal.
646,156.—EASEL SUPPORT—G. A. Peterson, S. F.
646,374.—MOTOR FOR VESSELS—R. T. Power, Westminster, Canada.
646,239.—BUTTON FOR SLIDING DOORS—D. Schuyler, San Diego, Cal.
646,391.—PROPELLING APPARATUS—F. W. Simmons, Felton, Cal.
645,979.—TRUNK TRAY—Sara B. Smith, Livermore, Cal.
645,980.—TRUNK—Sara B. Smith, Livermore, Cal.
646,059.—NUT LOCK—J. W. Stanley, Yuba City, Cal.
646,327.—DRYING ROOM—J. H. Therien, S. F.

Commercial Paragraphs.

IN connection with the late purchase of the Pacific Rolling Mill property at San Francisco by the Risdon Iron Works of San Francisco, the latter are overhauling the bar iron rolls, and within sixty days will be rolling merchantable bar iron. This of course will necessitate the bar mills being operated continuously night and day and will give employment to a large number of men. The Risdon expect to turn out from 300 to 400 tons of material per month and thus keep a large amount of money in circulation on the Pacific coast, instead of bringing the material from the East. They have also made a start tearing down old buildings, preparatory to erecting new molding shops and boiler works immediately, which will contain the latest electrical cranes and large tools for ship and boiler construction. The Risdon Iron Works have the contract to triple-expand the machinery of the steamers Mariposa and Alameda of the Oceanic Steamship Line and the new boilers for these steamships are almost ready to be installed. When these ships lay up they will be taken to the Risdon's new shipyard and there overhauled and fitted up.

Latest Market Reports.

SAN FRANCISCO, April 5, 1900.

SILVER—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59⅝c (1000 fine); San Francisco, 59⅝c; Mexican dollars, 48¾c. This is the way the current issue of the N. Y. Financial News argues: "Silver is one of the immediate great purchases. It should have an advance of 10 to 15 cents an ounce within the next sixty days. There is no available supply on hand, while all Europe needs it as a subsidiary coin. India and China are increasing their coinage and will need silver from now on in increasing quantities. The present output of silver is largely derived as a by-product in mining for other metals, and it is not profitable to mine for silver alone under $1 per ounce, consequently it will not take much increased demand to put the price up to the figures indicated."

COPPER.—New York: Lake, 1 to 3 casks, 17.25 cash; carload lots, 17.00; Electrolytic, 1 to 3 casks, 17.00; carload lots, 16.75; Casting, 1 to 3 casks, 16.75; carload lots, 16.50. San Francisco: 17¼@18. Mill copper plates, 21½c; bars, 23½@25c. The New York exports of copper for the first twenty-nine days of March were 16,261 tons, breaking the record for any month in the history of the trade. The largest export record before this was in September, 1893, when shipments of 16,131 tons were made. The normal exports are 11,500 tons per month.

LEAD.—New York, $4.72½; St. Louis, $4.60; San Francisco, $4.95; pipe 7½, sheet 8¾, bar 6½c. London, Soft Spanish Lead, £16 12s.

SPELTER. — New York, $4.55; St. Louis, $4.40; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 50@55c ℔ lb.

SOLDER. — Half-and-half, 100-lb. lots, 21½c; San Francisco, Plumbers', 100-lb. lots, 18½c.

IRON. — Pittsburg, American soft—pig—large lots—$25.25; Scotch, $26.50; San Francisco, bar, per lb., 3½c.

STEEL.—San Francisco, bar, 12c to 20c per lb.

QUICKSILVER. — New York, $51.50; London, £9 12s 6d; San Francisco, local, $51.50 ℔ flask of 76½ lbs.; export, $47.50.

PLATINUM.—San Francisco, crude, $16 ℔ oz.; New York, $18; manufactured, $19.50@22.00.

FERRO-TUNGSTEN.—New York, 60c; San Francisco, 75c (60%).

FERRO-MANGANESE. — Pittsburg, $125.

MAGNESIUM.—New York, $3.50 ℔ lb.; San Francisco, $4.50.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

TIN.—New York, pig, $32; San Francisco, ton lots, 34c; 1000 lbs., 34½c; 500 lbs., 35c; less, 36c; bar tin, ℔ lb, 40c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 40c to 50c.

NICKEL.—New York, 40@45c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.80 50-lb lots; San Francisco, $2.50 to $3 lb lots.

TUNGSTEN.—New York, ℔ lb., 75c; San Francisco, 90c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ℔ set; 14 oz., 40s., 11c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 33@35c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, 1¾c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, strictly pure, boiled, bbl., 68c; cs., 73c; raw, bbl., 66c; cs., 71c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 47½c; cs., 52½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $7; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs, $10.05; Colorado Anthracite, $14.50.

San Francisco Stock Board Sales.

SAN FRANCISCO, April 5, 1900.

9:30 A. M. SESSION.

100	B. & B.	30c	50 Overman 21c
100	Crown P't.	19c	300 Potosi 18c
200	H. & N.	23c	50 Union 18c
100	Mexican	23c	800 Utah 12c
100	Ophir	84c	

2:30 P. M. SESSION.

200	Ophir	86c	50 C. C. & V. $1 60
100		87c	200 Savage 13c
300	Mexican	24c	50 Crown P't. 19c
100	G. & C.	17c	50 18c
200	B. & B.	32c	200 Alta 07c

Recently Declared Mining Dividends.

Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	April 4
Cloverdale Zinc M. Co., Missouri, 2% on preferred stock	April 10
Swansea M. Co., Utah, $5000	April 10
Idaho G. M. & M. Co., Washington, 1%	April 15
Favorite G. M. Co., Colorado, $48,000	April 20
Rex Oil Co., California, 5 cents per share	April 21
Yukon Oil Co., California, 4 cents per share	April 18
Westlake Oil Co., California, 2 cents per share	April 16

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

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—AND—
Locomotive Headlights.



SIZES ON HAND:
24-inch,
20 "
17 "
14 "
12 "
10 "
8 "
6 "

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Pacific Lamp and Reflector Factory,
585 MISSION STREET, : : : : : SAN FRANCISCO.

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POSITION BY A COMPETENT ASSAYER AND MINING ENGINEER. Understands cyaniding, milling, roasting of ores, etc. Has had experience Best of reference. Address F. W., this office.

ACCOUNTANT AND SECRETARY open for engagement after regular office hours. Work for incorporated companies a specialty; organization meetings, accounts opened or adjusted, etc. First-class references. Address L., care of this office.

FOR SALE.

DEVELOPMENT INTEREST
IN A PARTIALLY DEVELOPED MINE.

Good locality and splendid showing. Mill and equipments on property. Address S., 1122–13th Ave., East Oakland

FOR SALE.

A Group of Thirteen Placer Claims in Alaska on Creek Flowing Into Yukon.

Each claim has been prospected and shows good pay. Can be worked by hydraulic plant. $1000 in nuggets taken from a single claim the past winter—largest $55. Address W. L. READ, 601 New York Bldg., Seattle, Wash.

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Are too high in price to admit of as much profit as the cheaper grades usually handled by agricultural implement dealers A cheap vehicle costs just as much freight from the East as a good one, thus you get but little value for your money after paying three profits and freight.

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COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

WANTED.

A competent and experienced Hydraulic Engineer capable of taking full charge of an extensive piece of work. Answer: Wrenn, California Hotel, S. F.

Wanted—Gasoline Engineer,

One who is a machinist preferred. Applicants state references and salary expected. Address M. M., care of this journal.

GASOLINE HOIST WANTED.

Second hand but in perfect condition. 10 H. P. W. B. MURDOCH, 405 Montgomery St., San Francisco, Cal.

WANTED TO BUY,

Two or Three Saddle Tank Locomotives, 36-Inch Gauge, Porter or Baldwin Make Preferred. Must be in good condition. TORBERT & PECKHAM, Monadnock Block, Chicago.



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STRUCTURAL MATERIAL,

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For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.

For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

Quicksilver Mine.

FOR SALE, interest in developed quicksilver mine. Furnace completed. Cheapest property on the coast to work. Capital required for additional machinery. Address "Investment," care of Mining and Scientific Press. PRINCIPALS ONLY.

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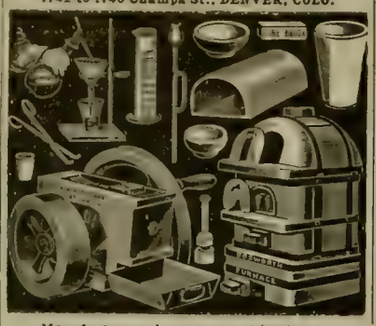
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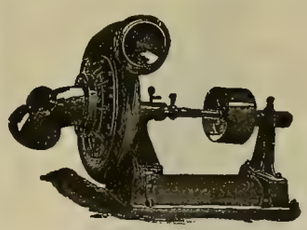
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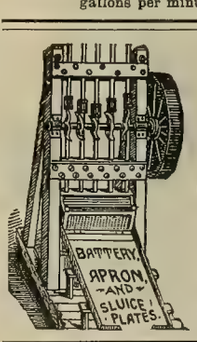
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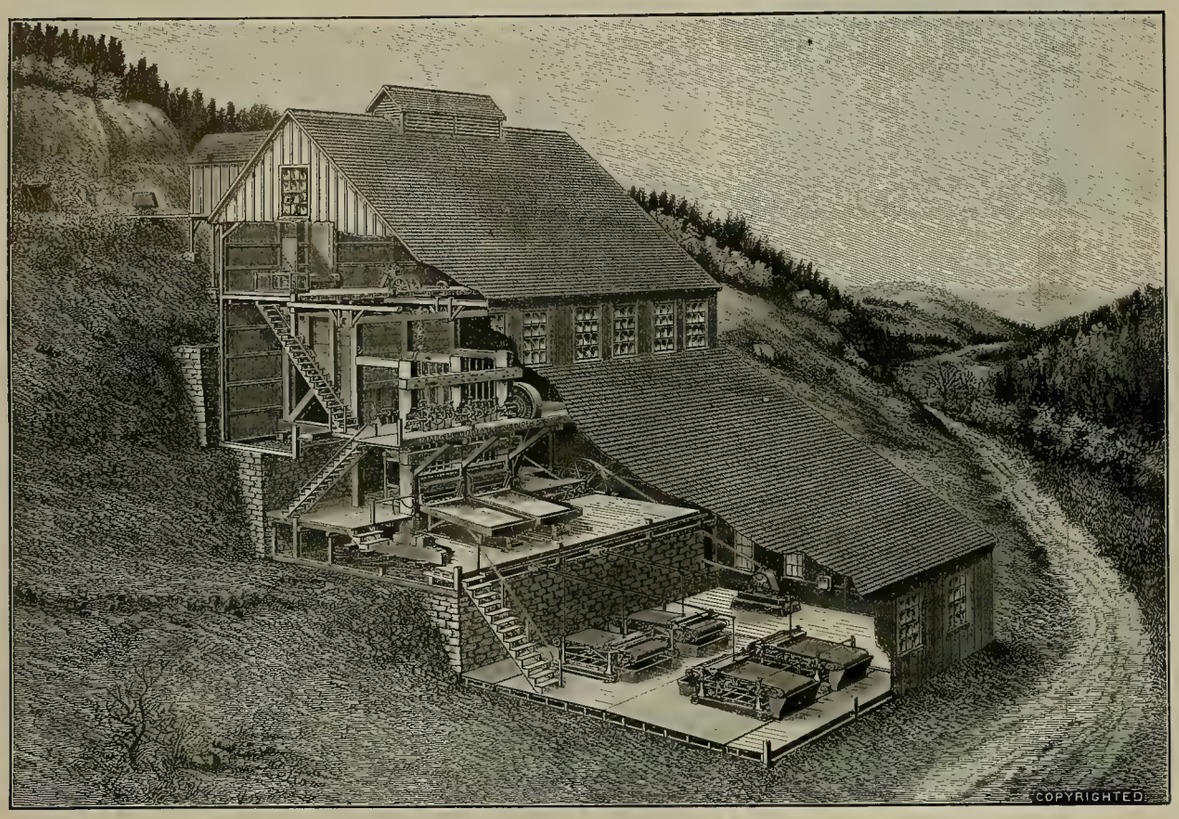
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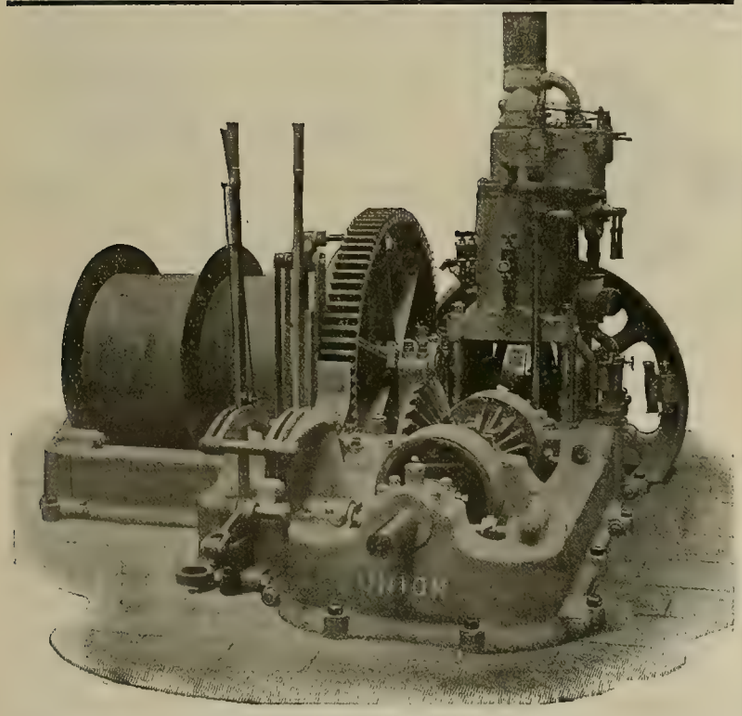
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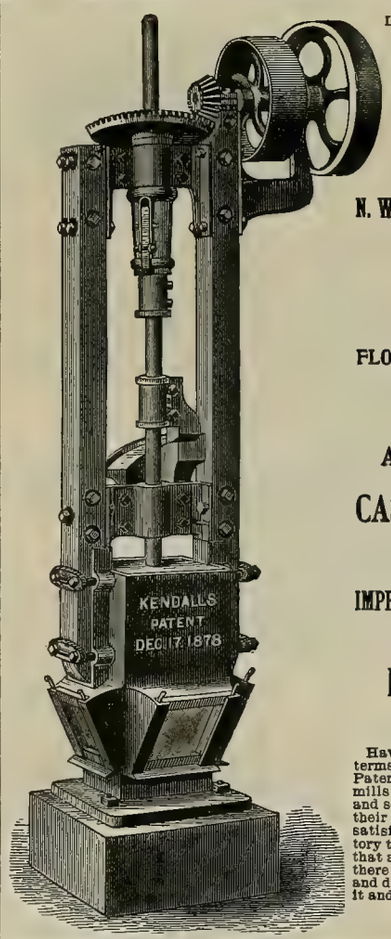
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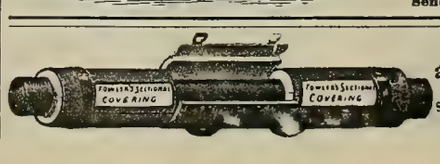
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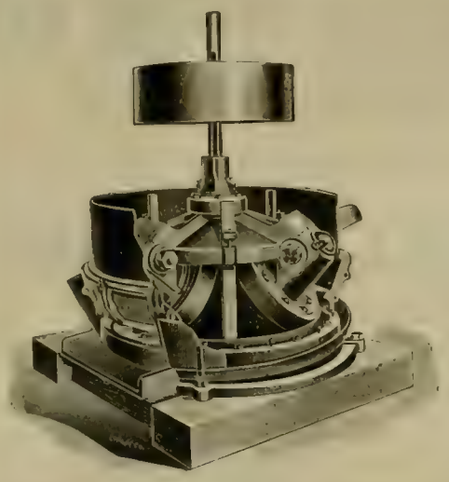


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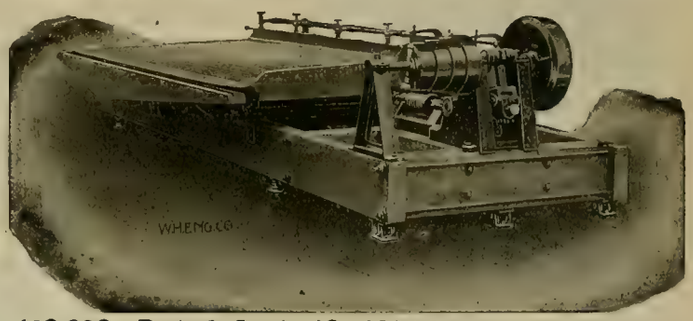
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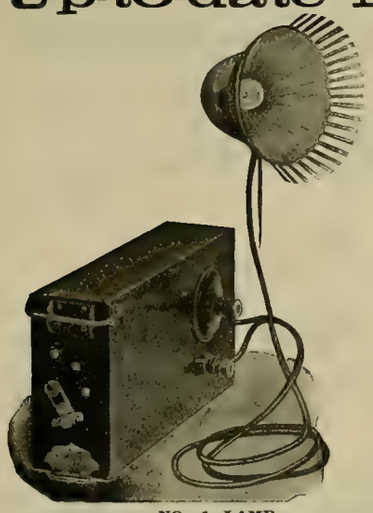
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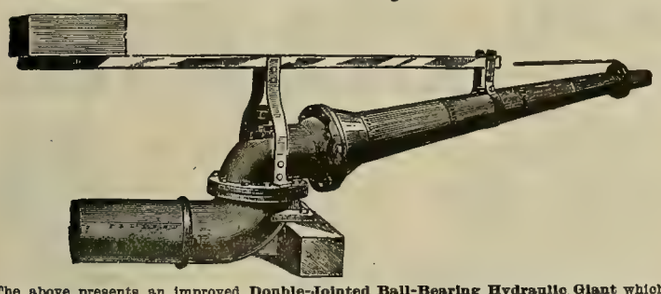
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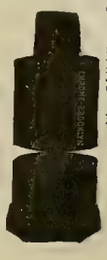
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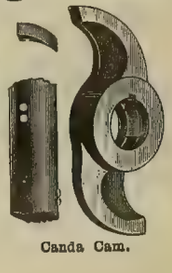


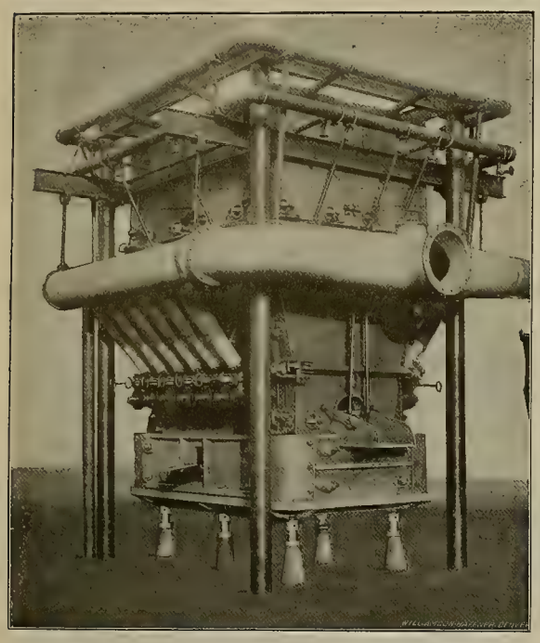
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(SEE PAGE 393.)

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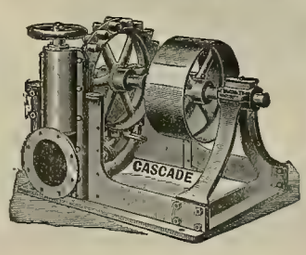
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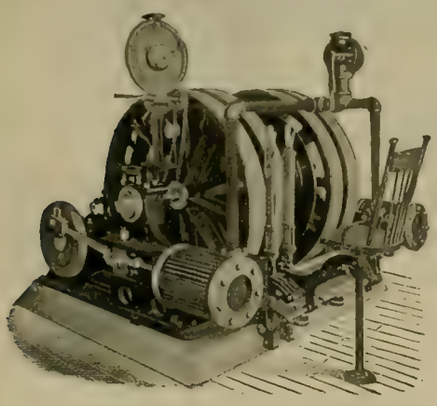
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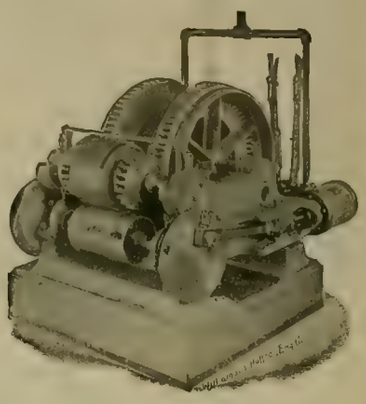
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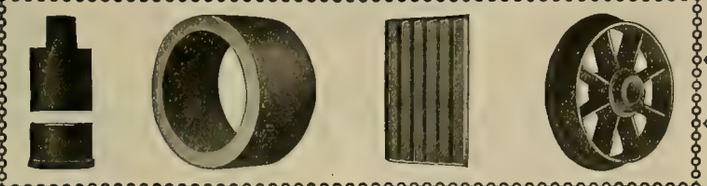
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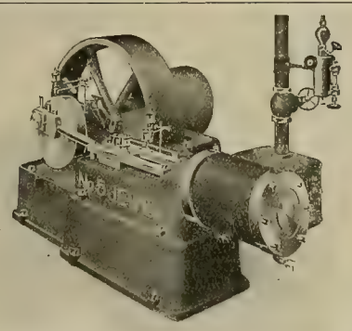
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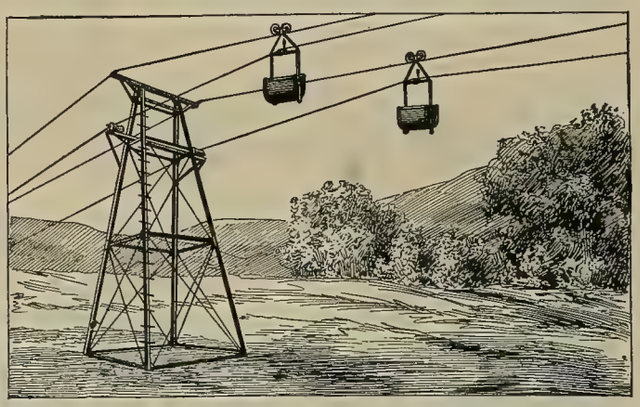
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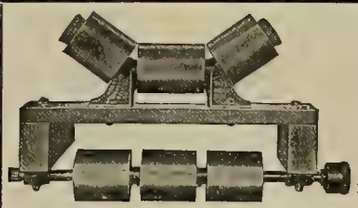


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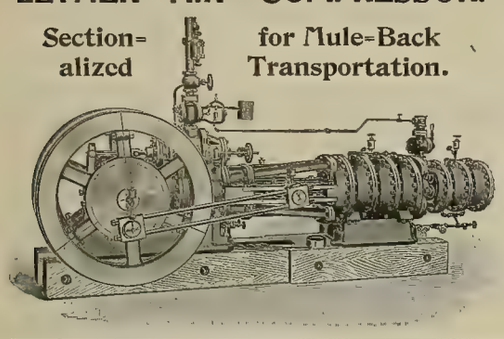
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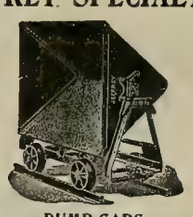
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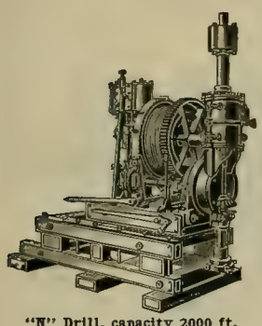
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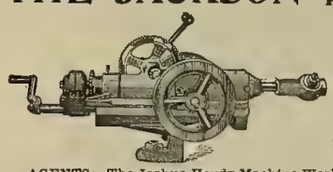
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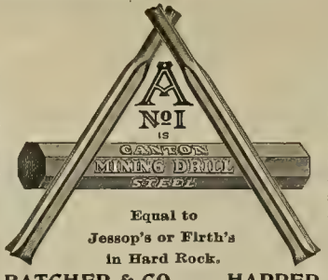
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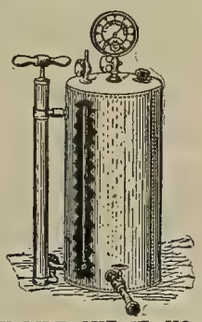
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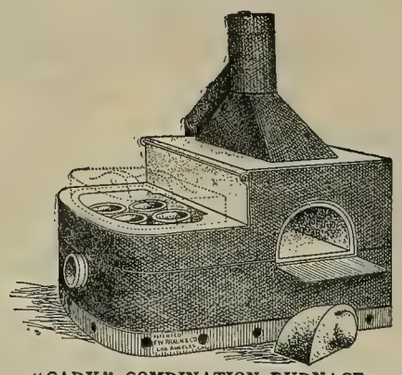
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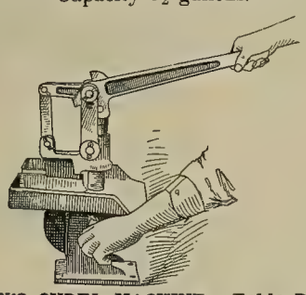
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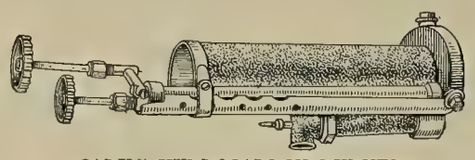
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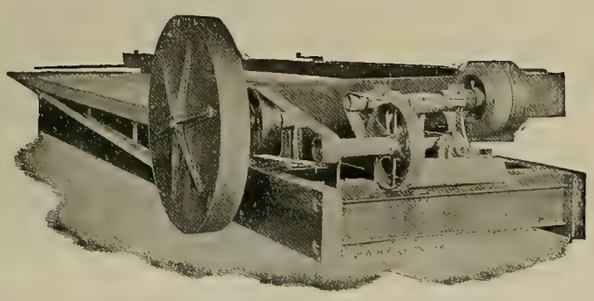
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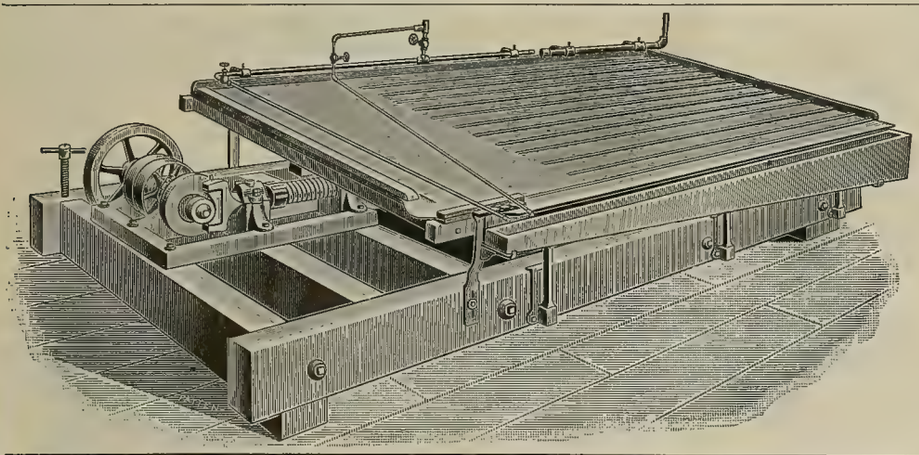
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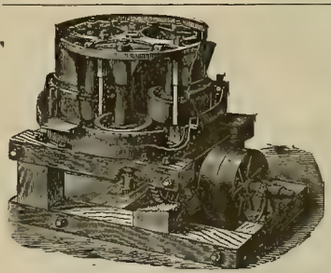
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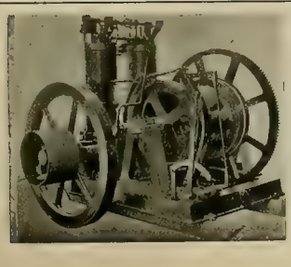
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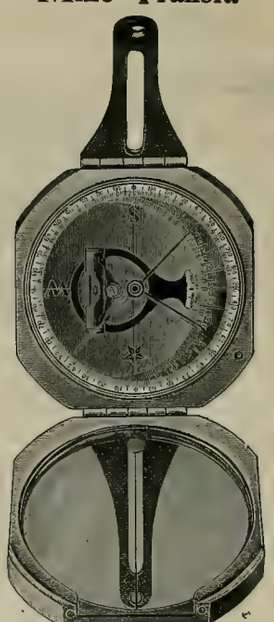
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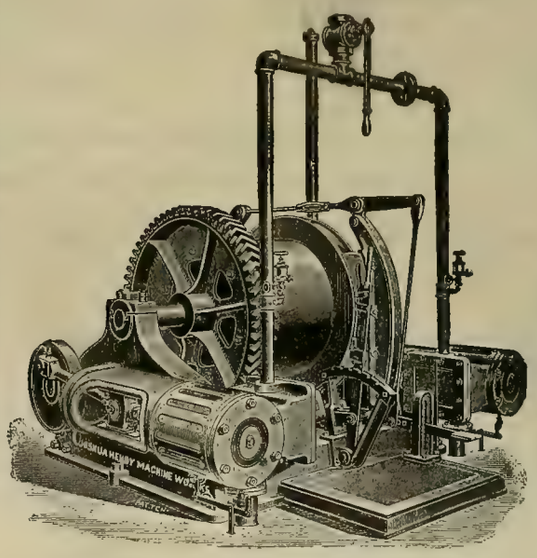
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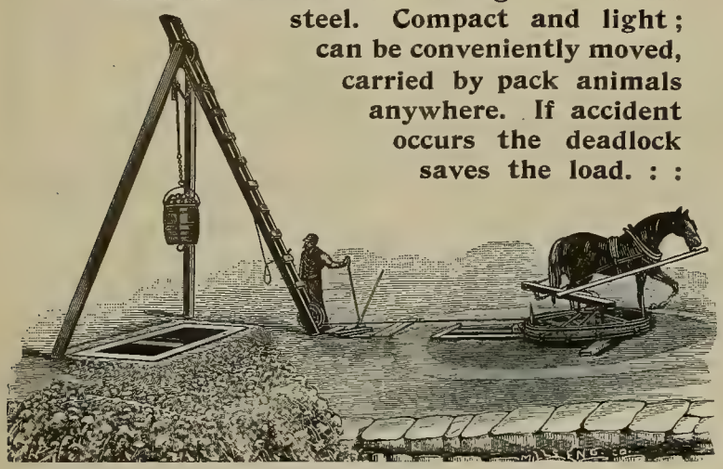
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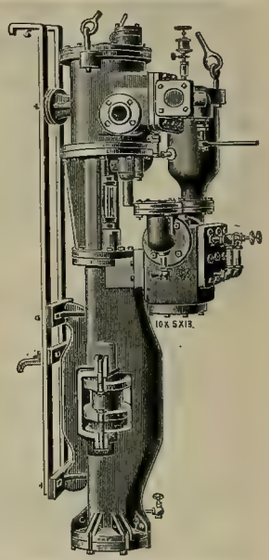
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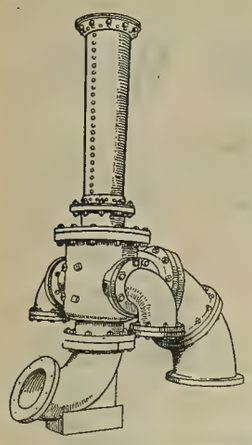
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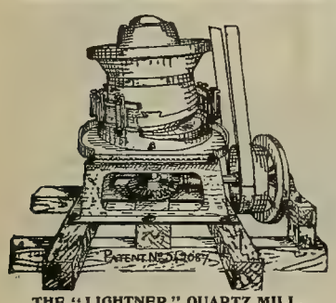
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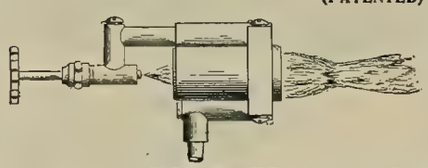
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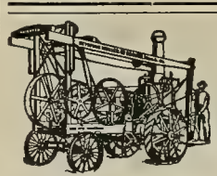
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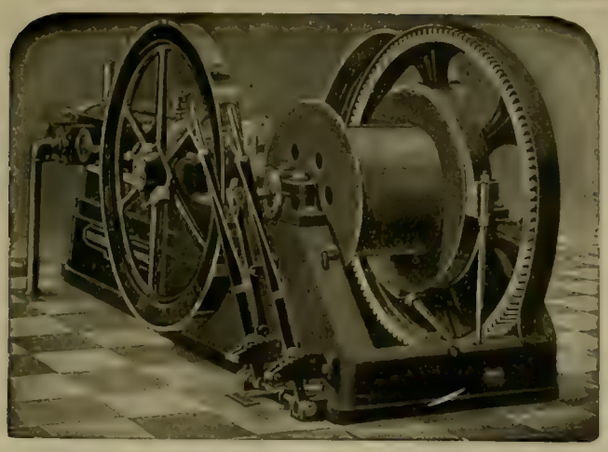
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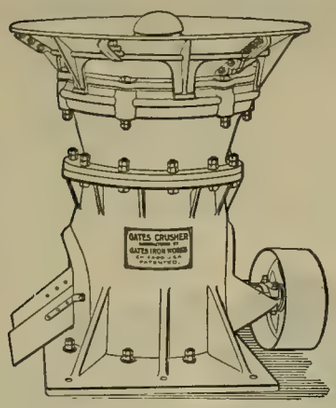
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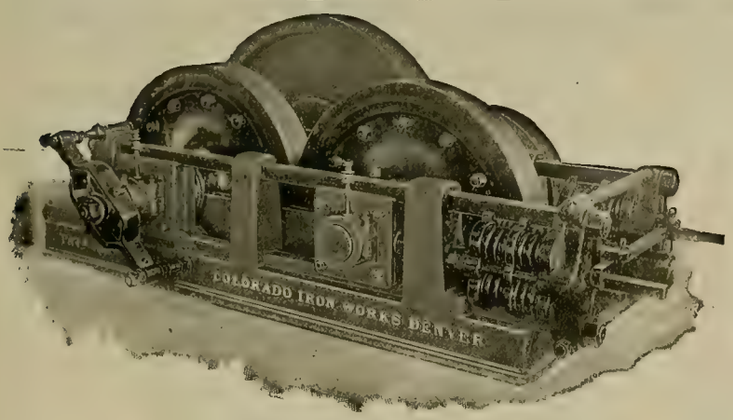
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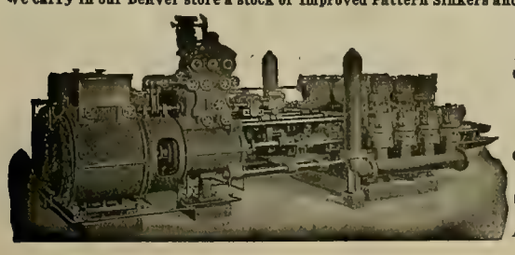
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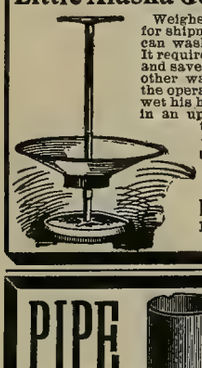
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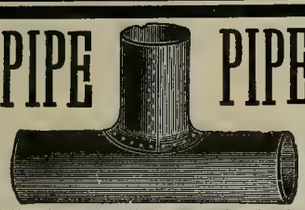


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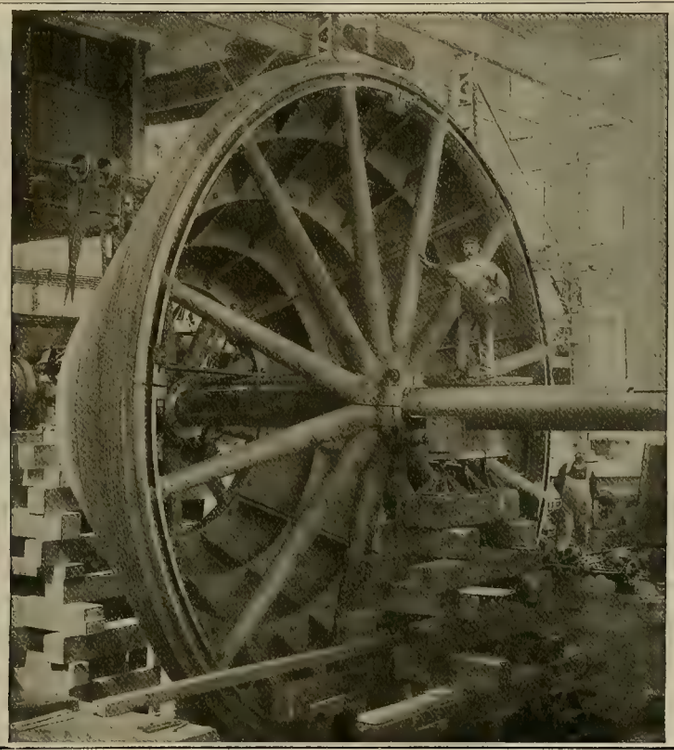
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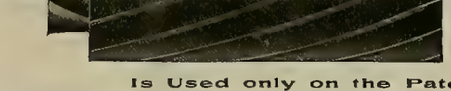
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is given to emphasize the fact that all their machinery is erected and put in running order before shipment so that there is no difficulty or extra expense in placing it at the mine. This is an important point to consider in PURCHASING MINE MACHINERY.

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ASSESSMENT NOTICES.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of April, 1900, an assessment (No 23) of 2 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of May, 1900, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 28th day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

SOUTH PALOMA GOLD MINING COMPANY, Limited.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 17th day of March, 1900, an assessment (No. 2) of six-tenths (6-10) of a cent per share was levied upon the capital stock of the corporation, payable immediately to the secretary, John F. Barnett, at Room 22, No. 222 Sansome St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23rd day of April, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on MONDAY, the 14th day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN F. BARNETT, Secretary.

Office—Room 22, No. 222 Sansome St., San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of April, 1900, an assessment (No. 16) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of June, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of March, 1900, an assessment (No. 15) of twenty cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room No. 29, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of April, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room No. 29, Nevada block, No. 309 Montgomery street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1900, an assessment (No. 11) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of May, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 26th day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

OSCEOLA CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1900, an assessment (No. 9) of one (1c) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of April, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

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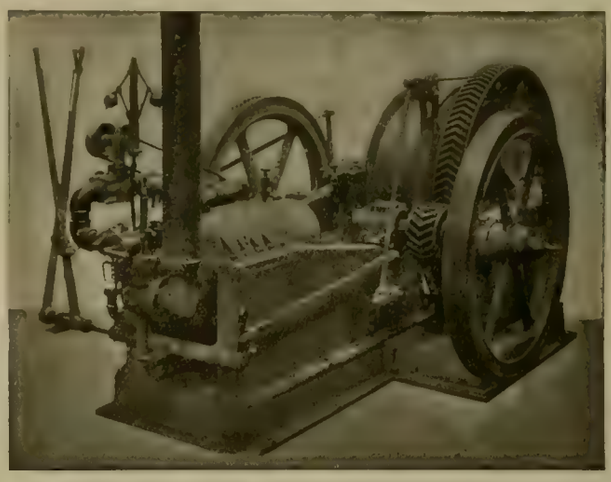
ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the Gwin Mine Development Company will be held at the office of the company, Nos. 1208-11 Claus Spreckels building, San Francisco, California, on TUESDAY, the 10th day of April, 1900, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. Transfer books will close on Saturday, the 7th day of April, 1900, at 12 o clock M.

J. J. CRAWFORD, Secretary.

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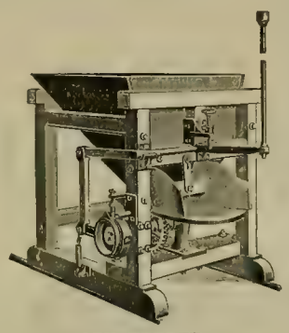
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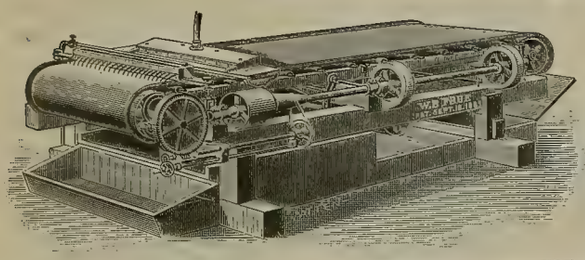
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The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

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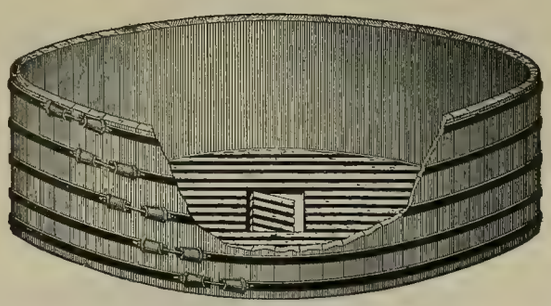
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THE "JAMES" ORE FEEDER,

as illustrated on this page, is a machine of improved design for the automatic feeding of ores to stamp batteries and other crushing machinery. It is perfectly adjustable while in operation, and will feed equally well ores wet or dry, coarse or fine.

Shipping weight, with wood frame, - 800 pounds.
" " " iron " - 1000 "



ADVANTAGES

The advantages of this ore feeder, over any others that are in the market, are, that the feed is positive and will not gig back no matter how slight the motion to the arm; it can not possibly spill ore of any character and will definitely measure out from one to fifty tons per day of any class of ore.

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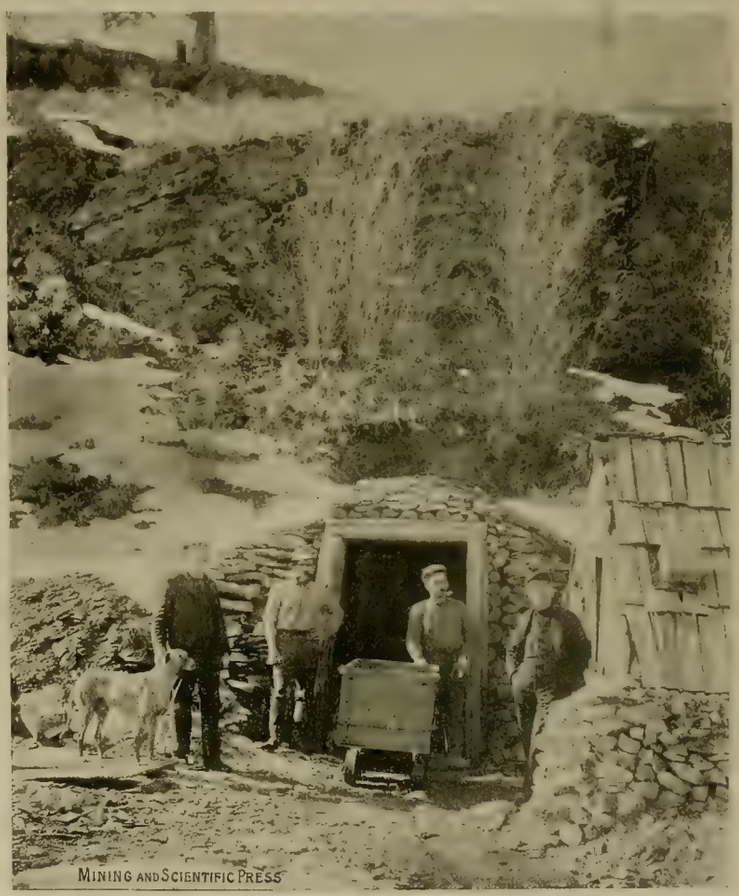
MINING AND SCIENTIFIC PRESS.
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No. 2073.—VOLUME LXXX. Number 15. SAN FRANCISCO, SATURDAY, APRIL 14, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

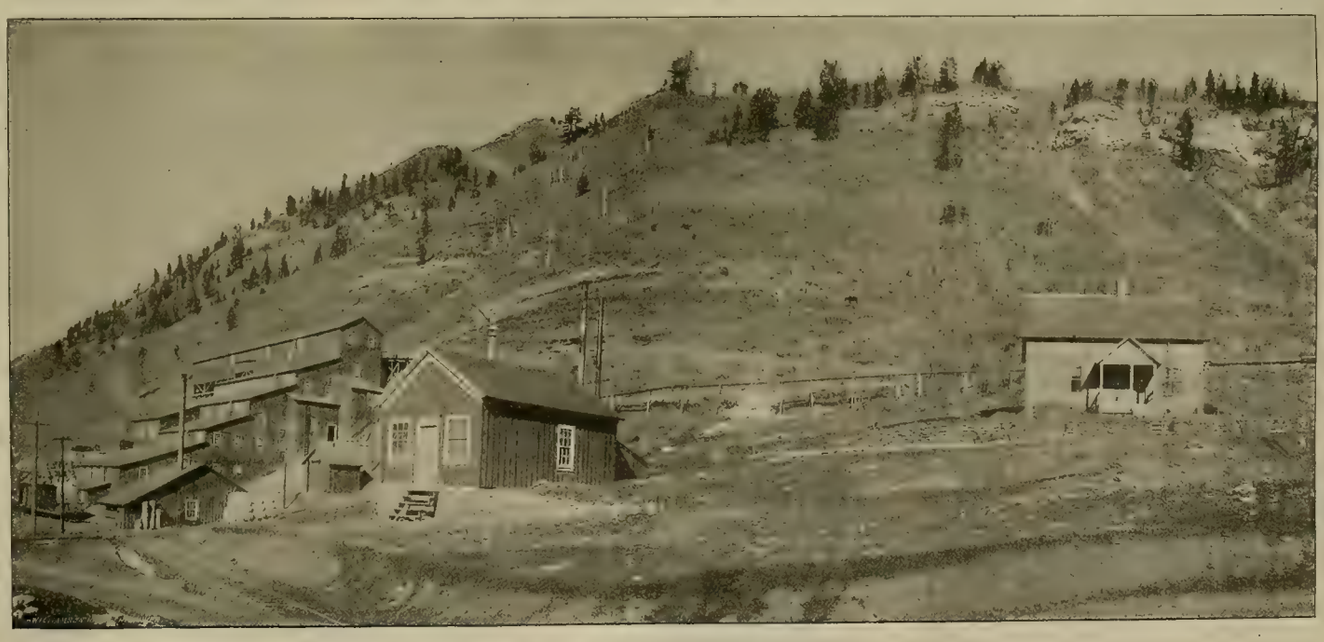
The Liberty Bell Mine and Mill, Colorado.

The Liberty Bell G. M. Co., at Telluride, in the San Juan mountains, San Miguel Co., southwestern Colorado, is fairly illustrative of mining progress in that section. The mines are two miles north of the town of Telluride; the mill is situated in the valley half a mile above town, connection being had with the mine by a tramway two miles in length with a daily transportation capacity of 480 tons ore. As the ore comes from the mine it is dumped into a bin, thence automatically fed over grizzlies, the coarser ore going direct to the crushers, the finer passing through the screen and conveyed by chutes to bins, where it is followed by the ore discharged from the crushers. From this bin the ore is automatically loaded into the tram buckets and conveyed to storage bins at the mill, whence it drops by gravity into automatic feeders, thence into the batteries where 850-pound stamps crush it, thence the pulverized ore passes over copper amalgamating plates, the entire product being concentrated.

At the opening of last year a 20-stamp mill had just been completed, and the property put in shape for experimental purposes. During the year the Liberty Bell employed sixty men at the mine, six at the mill and fifteen in construction work. As is the case with most mines of that district, the tailings from the amalgamating and concentrating tables carry away with the waste a considerable value. Last summer the company constructed a retaining reservoir, where the tailings flow was held and settled. Tests of these tailings demonstrated that their retreatment would yield a profit, and it was determined to construct a plant for that purpose. The improvised retaining reservoir being exhausted, the company on December 1st shut down the mill and suspended mining until the tailings plant could be completed. When this was done, work began upon a plant for the treatment of the tailings as they come from the mill, by the cyanide process. In the interim, pending the completion of the plant, development was being pushed wherever it was possible to open up new ground. A jig-back tramway 1000 feet in length, with a capacity for handling ten tons of ore per hour, was put in to carry ore from the Gold and Silver Chief level down to the main loading terminal of the tram to the mill. An electric power line was constructed from the mill to the mine, and an electric motor, 40 H. P., for furnishing power at the mine. The mill was doubled in size and capacity, twenty stamps being added to the twenty in operation a year ago. The mill has now been doubled again. Forty stamps more, with the necessary vanners and concentrating tables, are now in operation, with an additional electric motor, 40 H. P., for the mill. A spur has been laid from the Rio Grande Southern track into the mill yards. The construction of a cyanide plant, capacity of 300 tons per day, for the treatment of tailings has been completed. The mill now has a capacity of 300 tons per day of twenty-four hours, the process being amalgamation and concentration. The tailings plant, where the process is cyanide, has the same capacity. At the mine stoping has been carried on in three levels; the mine has produced and the mill treated 24,000 tons of ore, the product being in bullion and concentrates, development being continuously carried on. A total of 3000 feet of drifts, in which the vein is exposed, have been run, and the lower levels connected by raises. The company's headquarters is at Kansas City, Mo.; A. E. Stillwell, Pres.; Arthur Winslow, Gen. Mgr. and Cons'g Eng'r; W. Mercer, Res't Mgr. and Supt. To the Journal of Telluride we are indebted for the accompanying illustration.



Pabst Tunnel, Wehe Con. Mines, Palmer Mountain, Okanogan Co., Wash. (See page 407.)



Liberty Bell Mill, Telluride, San Miguel Co., Colorado.
Tramway towers and poles of electric power line shown on the hillside; laboratory in foreground; office to right.

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ESTABLISHED 1860.

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J. F. HALLORAN.....Publisher.

San Francisco, April 14, 1900.

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IN the issue of March 17th appeared the full text of the senatorial bill according federal aid to mining schools. This week the Senate Committee on Mines and Mining reported the bill in a modified form, providing for the utilization of a part of the proceeds of the sales of public lands in support of schools for mining in the public land States. It provides for the appropriation of $10,000 annually for the present in each case and the gradual increase of the amount to $20,000. By favorable and concerted effort in behalf of the measure, it stands a good chance of becoming a law at this session of Congress.

THERE is a coming together and a growing feeling of kindliness between the geologist and the miner, though many miners are still prone to affect contempt for the geologist, his methods, his opinions and his work. In this age of scientific mining, both geologist and miner can well work together, for together their best work lies. There is need of such mutual trust and assistance and mutual profit therein. They can supplement and complement each other. While, of course, a real miner will never have any other feeling than one of ill-concealed contempt for the charlatan—the pretended geologist who has learned a lot of names of rocks and knows little else—the real geologist who can collect his deductions and facts from the miner, who has a wide range of observation and reasons with accuracy, can be of material aid to the miner. Both are working for material success, and in this, as in other branches of business, knowledge is power.

FLOODS totally destroyed the great dam at Austin, Texas, last week, occasioning the loss of sixty human lives and about $2,000,000 direct damage. Its faulty character of construction was editorially pointed out in the issue of July 29th, '99. Holding post mortems is always unpleasant, but it is to be said that too much care can not be exercised by engineers in the plans and construction of such structures, and the expenditure of $100,000 more in proper placing of contracts sometimes saves millions, as in the case cited. That the dam was faulty was long known to engineers, and many were more sorry than surprised at the news of last week's disaster. The dam was 66 feet above foundation, 60 feet above low water at its foot; crest was 5 feet broad, inner top corner rounded off to radius of 6 feet. The down-stream face curved with a radius of 20 feet for about 70°, thence the face was straight with a slope of 3 on 8, ending with a second curve of 31 feet radius back to a horizontal line. The up-stream face was vertical. The material was granite rubble, with all faces finished in cut granite. The maximum flood discharge was estimated at about a quarter of a million second feet. The cross section seemed sufficiently heavy, and it seems impossible it could have failed as at first reported by cracking parallel with the base at a point about 25 feet down. A later report is of a crest depth of 10 feet (about 120,000 second feet) and that the dam failed by two sections near the center moving bodily down stream. This sliding on the base seems more probable than the first reported manner of failure but yet inexcusable from an engineer's point of view.

Stamp Mill Practice.

There is constant comparison and discussion of what for convenience may be termed distinctively California and Colorado stamp mill practice—in the former State the heavy quick-drop stamp and shallow mortar; in the latter the light slow-drop stamp and deep mortar with high issue. The Gilpin county slow-drop mill, a 500-pound stamp, dropping 16 inches thirty times a minute, with a deep mortar, an amalgamator as well as crusher, is typical of Colorado practice: the quick-drop 1100-pound stamp dropping 6 inches 100 times a minute, a coarse crusher, is typical of California practice. But as the Gilpin county bumper now divides the work in many a Colorado mill with other vanners or concentrating tables, so the slow-drop stamp now has considerable company of rapid drop.

The question is not one of expediency nor policy, but of results: whether it be Clear Creek or Gilpin Co., Colorado, or Nevada or Tuolumne Co., California, the millman aims to constantly suit the ore, and it is to be recognized that the gold ores of the two sections differ greatly. The ores of California, until considerable depth is reached, are mainly quartz and schists containing free gold: this the heavy stamp cracks rather than crushes. The surface ores of Colorado are not entirely dissimilar, but the oxidized part of the Colorado vein extends downward a comparatively short way—often less than 100 feet—while the oxidized area of the California vein is often found extending downward to a depth of 700 feet. The sulphide ores of Colorado are deemed by many millmen to need fine crushing and introduction of amalgamated plates inside of the mortar for successful extraction of gold by amalgamation, though this fine crushing entails a greater amount of slimes, which frequently carry off so much gold.

The California ore, which rarely carries more than 4% sulphurets, admits of coarser crushing, and consequent less dependence on amalgamation in the mortar. The tendency in California is toward increased stamp duty, now reaching a maximum of 5.5 tons per stamp per twenty-four hours. The present Colorado tendency is toward an increase rather than a decrease in the number of heavy rapid-drop stamps. It is noticeable that whenever an old mill is torn out at Black Hawk or elsewhere, and a new mill put in, the new battery is of considerably greater weight than the old.

With intent of amalgamation, some of the mills in Gilpin and Clear Creek counties, Colo., have two plates inside the mortar—one back plate and one front plate—put just below the discharge screen. The inside plates are generally arranged so that their upper edges are level with the pulp in the mortars, from 1½ to 2 inches above the surface of the dies. With the mortar the rear plate is usually 12 inches and the front plate 6 inches wide. The outside plates are the same width as the mortar—4 feet 7 inches; they vary in length from 6 to 16 feet.

In California practice the rear plate is 9 to 10 inches wide, of the same length as the mortar; the front plate is 4½ inches wide, and of the same length as the mortar. This plate is inclined from 10° to 20°; the rear plate inclined about 40°, depending on the shape of the mortar. An apron plate 2 or 3 feet wide is interposed between the battery and the table plates, there being a drop of 2 or 3 inches from the apron plate to the table plate. The plates are fastened to solid wooden tables, with raised sides, about 6 inches high. In California the table plates have an inclination of 1½ or 2 inches per foot, the apron plates an average inclination of 1½ inches. In Colorado, where, as noted, the ores are more heavily sulphuretted, these have an inclination of from 2 to 2½ inches per foot. It is this difference in sulphides that occasion the differences noted above in stamp mill practice throughout, as herewith detailed, in the two States.

A Colorado millman, working continuously in one locality and never traveling around, would be as much surprised at some things in California mill practice as a California millman, similarly circumstanced, were he to spend half an hour in some Colorado stamp mills.

As to which is "the best," it can only be said, as in everything else connected with the treatment of ore, that, from a commercial standpoint, that is the best process that pays the best.

Of course, taking even this criterion, there is manifest room for improvement. The two types discussed in this article are considered distinctively superior to some that might be cited, not for invidious or disparaging comparison, but by way of illustration, as some Australian mill characteristics, a crude design for mortar, the cam shafts not driven direct by belting, but run by tooth gearing, fifteen or twenty stamps actuated by a single cam shaft so geared, the tappets fixed and adjusted by screw-threads cut on the stem, eighty drops per minute considered rapid work, chilled iron shoes and dies instead of steel, and other characteristics that would indicate what might be mildly characterized as extreme conservatism. Yet, possibly, an Australian millman "bossing" things in one mill for twenty or thirty years would be indignant were it suggested that he was not up-to-date in stamp mill practice.

World's Production of Precious Metals.

The International Economist of Berlin gives an analysis of the world's production of precious metals. But for South African disturbances the production of gold in 1899 would have broken all records. As it is, the total yield reached about 970,000 pounds. After peace is restored in the Transvaal, the Rand and other African districts will produce 5,250,000 ounces, or double the production of 1897. With the increase from the United States, Australia and Canada, the twentieth century will commence with a yearly production of over 1,000,000 pounds. The German paper considers false the contention that the gold supply is insufficient, and that the present high price of money represents a consequent enhancement of the price of gold. Since 1871, when Germany abandoned the silver basis, the world has produced 13,500,000 pounds. From the discovery of America to 1871 the production only slightly exceeded 19,000,000 pounds. Within the last twenty-eight years the production was equal to two-thirds of the production of the four preceding centuries. Nevertheless, from 1492 to 1871 there never existed any fear of an insufficient gold supply. During the Californian and Australian discoveries, when the supply of gold increased 2,300,000 pounds, Chevalier preached a demonetization of gold; from 1894 to 1899 there has been an output of 4,600,000 pounds.

The production of silver does not decrease. The recent production of silver by ounces in the leading countries has been:

Country—	1898.	1897.	1896.
Mexico.....	56,738,000	53,903,180	45,718,982
United States	54,438,000	53,860,000	58,834,800
Australia....	13,021,682	11,878,000	12,238,700
Bolivia.....	8,204,568	8,204,568	6,374,240
Spain	5,957,965	5,957,965	5,770,357
Germany....	5,571,516	5,498,135	5,890,500
Other.....	21,363,841	24,971,324	22,224,691
Total.....	165,296,572	164,073,172	157,061,370

The world's production during 1899 is estimated at over 170,000,000 ounces.

AS COMPARED WITH other hazardous occupations, mining does not show extraordinary fatality. The Pennsylvania State Bureau of Mines and Mining has published statistics which show that in that State during the past thirty years 9575 lives have been lost in the mines. Between 1870 and 1879, inclusive, for every 1000 persons employed a percentage of 3.839 persons lost their lives. In the second decade, from 1880 to 1889, for every 1000 persons 3.210 persons lost their lives. In the third decade, 1890 to 1899, for every 1000 persons employed 3.140 lost their lives. The most noticeable features about these statistics are the fact that despite all the improvements in mining methods the percentage of fatalities has not diminished, and that such percentage continues during thirty years to be so remarkably uniform. It is believed that were similar data procurable for any metal mining region it would show a much smaller death percentage than the figures from the Pennsylsylvania coal mines.

Concentrates.

THE Ingersoll-Sergeant rock drill was patented May 30, 1871.

A SATURATED solution of salt boils at 226° F., under ordinary atmospheric pressure.

THERE is no State tax on the issue of certificates of stock of California stock corporations.

THE H. P. of 1 inch of water with 100 feet fall is .24147; of 40 inches, same fall, 9.6588.

THE convention of the Northwestern Miners' Association will be held in Baker City, Or., next June.

THE "miner's ton" in Great Britain, for weighing ores and mattes, is 21 cwt. of 112 pounds each, or 2352 pounds.

THE date of the meeting of the International Mining Congress at Milwaukee, Wis., has been changed to June 26–30.

PROMETHEUM or titan metal is an alloy of 60% copper, 38% zinc, 2% aluminum. A very little sodium is added when molten.

SILVER has been produced by the cyanide process at Mercur, Utah (the Chloride Point mine) at a cost of 23 cents per ounce.

THE gas consumed in one 16 C. P. gas jet, if consumed in a gas engine, would produce three 16 C. P. incandescent electric lights.

IN silver halves, quarters and dimes $1000, U. S., weighs 803.75 ounces; in standard silver dollars $1000, U. S., weigh 859.375 ounces.

THERE is plenty of pumice stone in Sonoma county, Cal., and in Utah, but no local demand, and freight rates preclude competition with ballast importations.

SINCE July 1, '98, each placer mining location is considered as a separate claim in U. S. patent proceedings, upon which is required $500 in work or improvements.

BUT one discovery of mineral is required to support a placer location, whether it be of twenty acres by an individual, or 160 acres or less by an association of persons.

TESTS of mining ladders show that the weak ladder is the very dry one; the most dangerous ladder is the damp one; the strongest ladder the new one put together with cut nails.

A "BRITISH THERMAL UNIT," B. T. U., is the quantity of heat required to raise the temperature of one pound of water 1° F. at its temperature of maximum density, 39° F.

QUICKSILVER has sold for $1.55 per pound in California in '75; in '79 it sold for 33 cents per pound in California. At present it is sold per flask at the rate of 67½ cents per pound.

MANGANESE steel (13% of manganese) is not magnetic, and of all the alloys of iron it is the one which presents the highest electrical resistance. There is a second allotropic variety, which is magnetic.

IT is a theory of some metallographists that solid metals evaporate from their surfaces, as camphor evaporates, while remaining solid, so that were one endowed with a finer sense of smell he could smell metal at a distance.

THE carat, the unit of weight for precious stones, carbons, etc., is 3.2 grains, varying slightly according to different localities and authorities. The international carat is 3.168 grains, or 205 milligrams. Francisco de Mello, Rua Cons. Dantes, Bahia, Brazil, deals in carbons.

WHERE water on public land, subject to appropriation, flows in a stream, any one may appropriate any of the flow not already appropriated; but no one so appropriating it can legally diminish or interfere with the full supply of a prior appropriator.

THE term "apex" does not mean a point, when used in connection with mining lodes. It means the top of the ledge or lode, the point which comes nearest to the surface of the ground. The part from foot wall to hanging wall at the top of the lode nearest the surface is the apex.

THE best practical education is that which makes intelligent labor most financially productive. Life being short, it were better to be a specialist than an "all-round" man, for now-a-days the man who "can do most anything" can do no one thing well, and is not in demand.

THE water storage required to produce 1 H. P. for one hour, with an available head of 10 feet, would be represented by the capacity of a tank 20 feet square and 10 feet deep; at a head of 140 feet the storage tank would still be required to be 10 feet square and about 3 feet deep.

IN case the owner of a quartz mill or reduction works is not the owner or claimant of a vein or lode, the law permits him to make application therefor in the same manner prescribed for mining claims, and after due notice and proceedings, in the absence of a valid adverse filing, to enter and receive patent for his mill site at $5 per acre.

COMPRESSING the gas and air mixture in a gas engine produces quicker combustion and greater explosive pressure. A 30% compression will produce more power than a 15% compression, but there is probably a limit to the economy of compression by its increasing the negative pressure. The relative volumes of gas and air also have a controlling effect in compression gas engines. One part gas to six parts air gives the highest efficiency in the higher compression, probably up to three atmospheres. The heat of compression also favors rapid and perfect combustion.

PLATINUM has never been found in place in California, but is not uncommon in northern California in both recent and older gravels, and in eroded channels in the serpentine in connection with gold, from $\frac{1}{10}$ to $\frac{1}{2}$ of 1% of the weight of the gold, though in the case of black sand containing gold the platinum percentage is often much higher.

OWNERS of valid mining locations made and held in good faith under the mining laws of the United States and the regulations thereunder, are authorized and permitted to fell and remove from such mining claims any timber growing thereon, for actual mining purposes in connection with the particular claim from which the timber is felled or removed.

COLORADO MEN claim that the Enoch shaft on the Pactolus property, Cripple Creek district, was recently "salted" by the scientific method of "squirting chloride of gold" on the quartz containing the ore proffered for examination, the experts refusing to be deceived thereby, though the immediate effect of the salting upon the local stock market was unsatisfactory—to the buyers.

FOR coarse jigs the usual length of the sieve is 28 to 36 inches, and the width 22 inches; for fine jigs the width seldom exceeds 18 inches. The sorting action of a jig depends upon the length of the piston stroke, the number of strokes per minute, the supplies of ore and water, and the discharge of the tailings, and of the concentrates. These are variable factors, according to the character and class of the ore, and the required products.

WHEN a locator locates crosswise of his vein his "side lines" become end lines, and his true side lines must be laid with reference to the ascertained course of the vein—parallel with and not more than 300 feet on each side of the center of the vein. If the width as originally marked is excessive, the excess should be discarded, so that the middle of the vein shall be in the center of the location. The area thus excluded is subject to appropriation.

NO ONE can answer the question "What is electricity?" Scientists think they have reason for belief that we live in a medium which conveys to and fro, or periodic, movements to us from the sun, that these movements are electro-magnetic; that all the transformations of light and heat, and, indeed, the phenomena of life, are due to the electrical energy which comes to us across the vacuum which exists between us and the sun—a vacuum which is pervaded by the ether, and which is a fit medium for the transmission of the electro-magnetic waves.

TO ASSAY copper borings or matte for gold, one method is to take an assay ton of the material in a No. 5 beaker. The sample is treated with a mixture of 100 c.c. water and 50 c.c. nitric acid of sp. gr. 1.42. When the violent action has ceased 50 c.c. more of nitric acid is added and the solution heated until everything soluble is dissolved. It is then boiled until the free nitric acid is expelled; then is diluted with 400 c.c. water, 5 c.c. sulphuric acid and 10 c c. concentrated solution of acetate or nitrate of lead. The precipitate of lead sulphate is allowed to settle, filtered and washed, and the filter and its contents are partially dried, wrapped in thin lead foil and transferred to scorifiers. Cupellation is conducted in the usual manner.

REGARDING the Evans hydraulic elevator pump used on the Comstock, the Risdon Iron Works of San Francisco, operating it, started in at the 750-foot station, which is a few feet below the level of the Sutro tunnel, and pumped the water out of a chain of mines extending over an area of about four miles long and one mile wide, lowering the water to a distance of about 400 feet below this point and pumping, approximately, 4500 gallons per minute for the past year. They used at various times since commencing the work 100 to 150 inches of water, of 1½ cubic feet. "Concentrates" does not know of any other part of the world where a hydraulic elevator has been used under such a lift as on the Comstock.

U. S. ENGINEERS and others figure that in parts of California's Sierra foothills, notably near the Forest Hill divide in Placer county, there are great gold placers to be mined by the drift method, the gold to be got out from under the lava. The channels of the old rivers under this capping are much richer than those of the modern rivers and placers that yielded a thousand million dollars in gold. This because the channels of the ancient rivers had served as bedrock sluices for untold ages before the disturbing lava flows began. The present rivers of California received the greater part of their gold by cutting across and carrying away great sections of the rich channels of the ancient rivers. In this way sections of the ancient channels, miles in length, were carried away and redeposited, as is to be noted at the canyons of the present river system. Thus the ancient channels, which have a north and south course, are left lying in sections between the present rivers, which run from east to west.

QUANTITY and pressure or their equivalents are the prime factors or makers of all forms of energy. If water is to exert power, one is always first concerned about the head of pressure and the volume at his disposal, for if he had a head equal to 1,000 feet, but only a supply of one gallon per hour, at this enormous pressure and small quantity the power would be no greater than when the volume was 1,000 gallons an hour with a pressure of 1 foot of head. In the same way if steam is supplied at a pressure of 300 pounds on the square inch, with a volume of only 1 cubic foot per minute, it is manifest that the power at one's disposal is here also small. On the other hand if 1,000 cubic feet of steam per minute are available at a pressure of 300 pounds on the square inch, then the power is great. What is true of water, steam and air and all other mediums of transmitted energy is equally true of transmitted energy through metals, as in the case of electricity, for in it volts constitute the factor of pressure, and amperes constitute that of volume.

GOLD is extracted from sulphurets at a profit by wet process or by fire process. The wet ordinarily includes chlorination or cyaniding with their several combinations; in smelting or the "fire process" the gold is absorbed by metallic lead or copper sulphide if the gold sulphurets and either of those are brought in contact melted, there being two products, slag and lead, the latter absorbing the gold, or slag and copper matte, which has combined with the gold. In one case the gold is liberated by electric refining or by turning the matte over to the lead blast furnace, where the iron of the matte acts as a flux, the lead combining with the gold, which undergoes the final process of separation and refining. The better plan, wet or fire, the cost of each, how closely the gold values may be extracted, can only be determined by local circumstance and requirements. The subject has been treated in fullest detail in these columns and is among the most interesting and important of all metallurgical questions.

CRACKS in cast iron cylinders may be closed in the following manner: The cylinder is filled with a certain quantity of perchloride of iron. The liquid is then compressed until globules appear on the external surface. The cylinder is then impregnated with perchloride of iron right through, as regards its thickness. Any perchloride in the cylinder is then emptied out, the cylinder being then wiped until the polished surface is again made brilliant. It is then filled with ammonia at 22° Baume, this also being subjected to compression. The effect of this operation is soon noticeable. The perchloride of iron in the metal becomes transformed under the influence of the ammonia into hydrated oxide of iron, at first somewhat frothy in character, and afterward, under the influence of the external pressure, rough and compact. Some hydrochlorate of ammonia also remains, which will soon afterward react on the iron, which will eventually be converted into an oxide compound, adding itself to the first. The leaks marked at the commencement of the operation will be entirely stopped as soon as the ammonia commences to move out externally.

METALLOGRAPHY treats of the structure and forms of the various constituents of metals and alloys and the changes in these forms brought about by external influences. The study of the relations which exist between the arrangement of the constituents of a substance and its physical properties is also a part of the science. An alloy which is to be investigated is first polished and then treated with an acid which attacks its different constituents unequally. An uneven surface is thus obtained, from the study of which definite knowledge as to the nature of the substance under investigation can be attained. The application of the methods of metallography to the study of the industrial alloys and particularly to the investigation of iron and steel has yielded important results. Two steels of the same chemical composition may have entirely different physical properties, depending on the treatment which the metal has received in the course of manufacture. Hammering, rolling, overheating, burning, etc., have a marked effect on the sturcture and consequently on the physical properties of the steel. These different forms of treatment, as well as the inclusion of slag and flaws, which are often the cause of serious accidents, are revealed by a microscopic study of the etched metallic surface.

ALTERNATING electric current apparatus is advantageous for the development of high voltages, because commutation is not necessary, and alternating current with any pressure or voltage can be readily transformed to any other voltage without the use of moving mechanism. While no exact definition of electricity or magnetism is possible, there is a definite mathematical relation between the two, as it is positively known that when an electric conductor is subjected to the influence of a variable magnetic field an electro-motive force is generated in such conductor, proportioned to the rate of change in magnetism. If, therefore, a conductor carrying alternating current be wound on an iron core, the continual change in the rate of magnetism, due to the reversals in the direction of the current, tends to cause counter electro-motive forces, which are antagonistic to, and tend to hold back the original or primary current and at the same time tend to produce current in another conductor wound parallel to the first, or on the same core. Calling the circuit carrying the primary current the primary, and the parallel current the secondary, the voltage in the secondary circuit may be made any proportion of that in the primary by simply varying the number of turns, but the work done in each will be the same, less ordinary losses. For instance, 10 amperes at 100 volts in the primary will in a secondary containing $\frac{1}{10}$ the number of turns give 100 amperes at 10 volts. This is called step-down transformation, because the pressure is reduced. If, however, the primary contains a fewer number of turns, the pressure in the secondary is increased, which is called step-up transformation. It will be observed that this operation is performed without moving parts, the variations in the strength of the current producing results akin to those resulting from the motion of the conductors of an ordinary armature across a magnetic field.

Scrip and Law of Title to Oil Lands.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by A. H. RICKETTS.

It has always been the settled policy of Congress to exclude the mineral lands from the operation of the general land laws—that is, from grants of land to States or railroad companies, from pre-emption or homestead entry, etc.—but it is well known that large areas of mineral land in this and other States have been patented as non-mineral land. This is largely due to the fact that heretofore in the majority of cases the application has been granted upon a purely exparte showing agreeing with the classification of the land made by the surveyor when surveying the land. The passing of the absolute title of the Government to the applicant for either class of land is confided to the land department, whose determination of the character of the land when evidenced by the patent, whether right or wrong, is conclusive, in all courts and places.

The character of land patented as agricultural land is not changed in the eyes of the law by subsequent mineral discovery therein, and vice versa. Any person going upon such land for the purpose of prospecting the same for mineral, without the consent of the owner, is a mere trespasser. He can initiate no right to a mining claim by adverse entry thereon.

At the time the public survey of public land is made it is the duty of the deputy surveyor under the law of 1796 to "note in his field book the true situation of all mines, salt springs and mill seats which come to his knowledge, all water courses over which the line he runs may pass, and, also, the quality of the lands." It is under the last provision that the report of the surveyor is made classifying the land as agricultural or mineral land, and which return is prima facie evidence that the land is of the character assigned to it by him. The examination upon which this conclusion is based is generally of the most superficial character and is often made by a person who is not qualified, theoretically or practically, to pass upon the mineral value of the ground; or, if otherwise, he does not in any event take the time to carefully examine it in order to truly determine its real character, even were it possible in all instances to state with any accuracy whether the land contained minerals or not. That fact is often only ascertained after expensive and careful exploration. There is no law nor instructions requiring the surveyor in his line of duty to go anywhere than along the borders or outlines he is surveying.

He merely passes over the confines of the section, with his attention more directly absorbed by the duties of his scientific profession and the necessity for absolute accuracy in his courses and distances. Even were he a geologist or mineralist his opportunities of observation along the course of his lines would be the scantiest, and beyond those lines, or on either side of them, his duties do not carry, but prohibit him from going. So that, practically, the interior of the section, or that portion thereof not immediately along the line being run, is beyond the observation or knowledge of the surveyor, and his opinion in relation to the same cannot be properly of much value. His return does not preclude proof of the facts as they really exist. If land is proven to the satisfaction of the land department to be more valuable for mineral before an agricultural claimant has acquired a vested interest therein it will not be patented to him as agricultural land.

As a rule, nearly all land is officially returned as agricultural land of the first, second or other lower grades and the surveyor's judgment in this respect is always adopted and approved, as, of course, by the United States Surveyor-General; it then becomes a part of the records of the land office and a menace to the mineral claimants of any part of such lands, because upon the latter is thrust the burden of proving the contrary. The value of the average surveyor's report in this particular may be demonstrated by saying that the land within which the famous Iron Mountain mine in Shasta county is situated, and which produces a profit of about $1,000,000 a year, was returned and patented as agricultural land, because the land office records showed it to be such, under the now practically extinct species of scrip known as "Agricultural College Scrip." A great part of the land embracing the Utica mine in Calaveras county was returned as and is patented as non-mineral land. Nearly all of Grass Valley mining district—which contained more mineral of value than any similar extent of territory in California—was returned as agricultural land. It is a notorious fact that many miles of the Mother Lode of California were so returned and are held under patents issued to agricultural claimants.

It is also well known that thousands of acres of land in the oil districts of this State are classed as agricultural land in the land department records, the entire surface of which is covered by shales and gypsum—the latter of commercial value both in quantity and quality. On the strength of the record of the land department, such lands have been selected by the "scrippers" as agricultural in character, although the same are covered with placer locations, and wholly unsuitable for cultivation.

It seems to be generally assumed that all land is agricultural until it is proven to be mineral, and the question being raised in the case of a contest between mineral and agricultural claimants the test is whether the land as a present fact is more valuable for mining than for agricultural purposes; conjectures, surmises or even probabilities not being indulged in in the miner's favor.

In other words, it is not sufficient in such a case to show that the land is of little agricultural value—that it presents indications of containing mineral in paying quantities—but from actual production that it is of value for the mineral it contains, and not from any theory that it may produce it. This is the rule laid down by the land department, and is possibly in the nature of legislation supplemental to the mining law by a quasi judicial tribunal in excess of its jurisdiction. This rule of the land department has been adopted by the courts. The mining Act of Congress expressly excludes all land valuable for minerals from the operation of laws governing the acquisition of agricultural lands. But no method is provided in the Act for determining what such lands are. There is no rule provided by statute to determine the extent or value of the deposit of mineral which will make a tract of land mineral; and the courts and the land department hold that land is not mineral although it may contain some measure of gold and silver when the contest is between the miner and the agriculturist.

There does not seem to be any good reason why the rule which is applicable to mining locations when the contest is wholly between mineral claimants should not prevail in all cases. That rule is: that a location is valid, as between mineral claimants, where a discovery of mineral is made which is not, perhaps, of commercial value in either quantity or quality, but which the discoverer is willing to spend his time, labor and money in developing. Yet, such a location would not stand the test in a contest between mineral and agricultural claimants under the existing rule of the land department.

The early miners of California, drawn here from all parts of the world by the rich superficial auriferous deposits of the placer mines of this State, and practically without precedent to guide them, framed a code of laws suited to their own peculiar needs. In time the working of surface claims gave way to the exploitation of quartz veins, and the different mode of mining and rights of ownership of such claims gave birth to an entirely different code of laws, which have become the American common law of mining; thus showing the adaptability of the early miners to meet conditions as they arose. Had the mining Acts of Congress been passed in the days of the California placer or surface mines, we could understand that the land department had construed them properly by its stringent requirements, as above stated, because the value of the land as mining ground could have been demonstrated, say, in a day and without expense. Oil mining more closely resembles lode than placer mining. To prove the value of a lode claim is now and always was a very different matter from proving the value of a placer claim. Lode claims require time, the expenditure of large sums of money, the prospecting of the ground at great depths below the surface, the possible loss of the vein, and other incidents, delays and disadvantages to which the placer miner was a stranger. Many largely productive quartz mines have been the result of the fortunate finding of a blind vein—that is, one not appearing on the surface. It is well known among miners that it is not always the richest mines of any class that show upon the top of the ground. The segment of the Comstock lode—the Bonanza mines—which produced the greatest wealth was not where "Old Virginia" and his associates discovered the deposit of silver ore that electrified the world. That deposit was upon the surface of the Ophir mine and some distance northwesterly of the Great Bonanza. The surface of the Bonanza mines and the croppings thereon gave but little, if any, indication of the enormous and valuable mineral deposit existing below and far to the east of the croppings of the Con. Virginia and California mines.

Congress, in the mining Act of May 10, 1872, first provided for the acquisition of tunnel rights, the Acts of 1866 and 1870 being silent upon that subject. That is, that law gave the miner the right to prospect for blind or hidden lodes where there were little or no indications upon the surface of their existence. It gave to the locator of a tunnel claim the great length of 3000 feet along the line of the tunnel and the further exclusive right to locate upon the surface any and all lodes he discovered in running the same, but without right to patent the tunnel site.

There does not seem to be any good reason why the petroleum miners of to-day should not be accorded a substantially similar right while engaged in drilling wells or the running of tunnels for the discovery of petroleum or other mineral oils; nor why the example of the pioneer miners of this State in providing new laws for changed conditions, as heretofore shown, should not be followed by Congress. The petroleum miners need appropriate legislation to protect them in the discovery of mines containing the fluid minerals as much as he who seeks to discover blind lodes. They are now placed on a par with the surface miner, although they must bore wells or run tunnels for the development of their claims, as land chiefly valuable for petroleum oil, or see them pass to agricultural claimants because of the absence of a proper provision in the mining law protecting them in their holdings while prosecuting such work.

The definition given by the United States Supreme Court that by the term "placer claim" is meant ground within defined boundaries which contains mineral in its earth, sand or gravel; ground that includes valuable deposits not in place, that is, not fixed in rock, but which are in a loose state, and may in most cases be collected by washing or amalgamation without milling, is plainly not applicable to a placer claim chiefly valuable for its petroleum or other mineral oils. Under the law of February 11, 1897, land chiefly valuable for petroleum or other mineral oils may be located as a placer mineral claim. That Act is remedial and curative in its nature and was intended to overcome the ruling of the land department that land containing petroleum did not fall within the contemplation of the mineral laws and could not be located and entered as a placer mine. That law declares that lands chiefly valuable for petroleum or other mineral oils were open to location under the placer mining law and also placed oil land claimants in the same position before the law as if they had made their locations on the date of the passage of that statute. But it appears the officers of the land department do not make any distinction between that class of claims and placer claims containing solid minerals. The rights of the oil miners are now determined by the same rules that govern a placer claim, located for building stone, though the one requires the drilling of exploratory holes perhaps hundreds of feet in depth or the running of a tunnel to a great length to demonstrate its value, while the other is merely quarried; or, the oil claim is put upon the same plane as a claim having a superficial auriferous deposit, the value of which can be proven with but little outlay of time and money. This is clearly unjust to the oil miner, being in utter disregard of the conditions which surround him.

(TO BE CONTINUED).

"Lawyers and Experts;" "Science and Law."

Lines read by Dr. R. W. Raymond in response to the toast, "Lawyers and Experts," at the banquet given to the A. I. M. E., San Francisco, Cal., September 27, 1899.

There was a man who had grown old
In digging prospect holes for gold.
Right often in his pilgrimage
He dreamed he had the long-sought ledge;
Yet every time, with spirit saddened,
He was obliged to own he "haddened,"
And every time he cried, "You bet
"I'll hustle on and find her yet!"

At last he struck it; staked a claim;
Laid out a townsite round the same;
Sunk, drifted, stoped and crushed away,
And showed the thing would surely pay.
Fondly he thought that nevermore
He would be luckless as before.
Alas, his troubles were not ore!

One dismal day his happy labor
Was interrupted by a neighbor,
Who coolly told him doubts had risen
Whether the ledge was "his" or "his'n,"
And challenged him, without excuse,
His legal "apex" to produce.
"Apex! What's that?" he cried in woe.
"I cannot tell you," said his foe,
But I presume the lawyers know.
And this much I can say is true:
Without it, all is up with you;
Nor is the apex all. You see,
You must have 'continuity,'
And side and end lines, suited quite
To fit your 'extralateral right';
And it is further understood
A tunnel in the neighborhood
Will make your title far from good.
Then, other lodes may make connection,
Taking the space of intersection,
Or even unite with yours, and so
Gobble whatever is below.
Sure, many such things may combine
To make your mine not yours, but mine.
If you don't buy me, fear the worst!"

That miner eloquently cursed,
And said, "I'll see you—elsewhere first!"

Thus was begun the famous case
That filled the journals of the place,
And thither called a mighty host
From all the wide Pacific coast—
A dozen lawyers on a side,
And eminent experts multiplied;
Maps of the biggest and the best,
And models till you couldn't rest;
Samples of rock and vein formation,
And assays showing "mineralization,"
And theories of that or this,
And revelations of "genesis,"
And summings-up of sound and fury
Poured out upon the judge and jury.
No matter now which party lost—
It took the mine to pay the cost;
And all the famous fight who saw
Beheld, with mingled pride and awe,
What science breeds when crossed with law.

Incandescent Light Filaments.

The standard electrical incandescent light for general use is of 16 candle power. Out of the 25,000,000 electric lights used every year in the world, this size numbers 90%. A carbon filament for that sized light measures $\frac{4}{1000}$ of an inch in diameter, 10 inches in length, and 200 of these put upon a scale weighed ten grains: with 7000 grains to the pound avoirdupois, it would take 140,000 of these filaments to make a pound; at the current market rate for these, $10 a thousand, their value would be $1400. A man can carry 150 pounds in a sack on his back, and, if his sack was filled with such bits of carbon, his load would be worth $210,000. Take but a single pound of these filaments and stretch them out in a continuous straight line, and they would cover a space of 133,333 feet, or about 21.3 miles. The world's product for the year would reach 3700 miles, and in a little more than six years, at the present rate, would reach completely around the globe.

But the value of the filament of this size is small when compared with that of some for the smallest of the lights made. Whether a filament be for large or small lights, it costs about the same sum to the market, but its candle power makes a great difference in its size and weight. The smallest of the incandescent lights used for regular purposes is of 3 candle power. For this the filament is of a plain U shape, and is $\frac{2}{1000}$ of an inch in diameter and $\frac{3}{8}$ of an inch long; there would be 1,000,000 of these to the pound, and these would be worth $10,000. But, again, the lamp makers manufacture many tiny lamps for surgical and dental uses. The smallest of these is called the pea lamp. Its tiny bulb is about $\frac{1}{4}$-inch in diameter, and physicians use it at the end of probes and similar instruments to illuminate the interior of the human body. Its carbon filament is but $\frac{2}{1000}$ of an inch in diameter and but $\frac{1}{8}$ of an inch long. This is but the 320th part of the volume of the 16 candle power filament, and it would take 44,800,000 of these to make a pound; their value would be $448,000.

Of course, the larger the filaments are the less they are worth by weight; but whether they are of a value of $1400 a pound or $448,000, it is interesting to consider that practically all of this value is the product of human labor and skill. The material out of which they are produced costs but a few cents.

In the early days of experimenting with the electric light the current was passed through a thin wire of platinum; at that time T. A. Edison had agents looking all over the world for new sources of supply of that rare metal. Then, as now, nearly all the platinum of the world came from California and two districts in the Ural mountains, in Siberia. Had the people remained dependent upon platinum for their lights they would have needed for each one a piece of wire $\frac{6}{1000}$ of an inch in diameter and 15 inches long, and this, at the present price of platinum—$18 an ounce—would cost 13 cents. The world's whole product of this metal in 1887 was but about 9500 pounds, and would have been inadequate for the present lamp supply. Even to-day, with a product of perhaps 13,000 pounds, there would be but a small margin left after making 20,000,000 lamps, and merely the cost of the filaments would be $2,000,000. It was at this juncture that Edison conceived the idea of using a carbon filament. He confided his idea to his chief assistant, Mr. Batchellor, and they began work one evening. It is one of Edison's peculiarities that, once started upon a piece of work, he does not stop for sleep and sometimes even food. The material from which he proposed to make his filament was a spool of cotton thread. All that night Edison and Batchellor worked and all the next day, and then again all the next night. At the end of thirty-six hours they had produced a perfect filament. Mr. Batchellor took it up and they marched with it toward the bench where a glass blower was at work. Just as they reached the bench the carbon broke. "Edison," cried Batchellor, "we wont sleep until we make one." Back they went to work, and late in the afternoon they completed a second carbon loop. Again they marched with it to the glass blower's bench and placed it there in safety, but just then a jeweller's screwdriver rolled over it and broke it. Batchellor was an even-tempered man, but that was too much.

"I'm damned!" he cried. "Job got too much reputation for patience on a small capital."

There was no giving up, however. Back to work the two men went. Experience had been a good teacher, and before night they had completed a third filament, got it safely mounted in a bulb, exhausted the air and set it glowing with the electric current.

For a while the filaments were made of pieces stamped out of visiting cards, and many after that were stamped from paper. Others were made from slivers of bamboo. Weston was the first, perhaps, to use vegetable parchment for the purpose, but that is what the General Electric Company use to-day. This is virtually the material of which artificial silk is made. Just the materials and process used no filament maker will tell, for this is one of the last of the trade secrets, and the only one about lamp making. A mixture of vegetable matter, rich in carbon, like paper stock or cotton, is taken and is digested with sulphuric acid or chlorides until it is a gummy mass about as thick as dough. This is forced through dies, just as vermicelli is made, and it comes out in endless strings. For 16 candle power filaments the die has an aperture $\frac{3}{1000}$ of an inch in diameter. The string of paste falls into a jar partly filled with a secret liquid, where it lies in coils. Then it is run out, washed, partly dried and coiled on cylinders to become entirely dry. Then it is cut into proper lengths, with allowance for shrinkage, and taken in bunches and wound on shapers to give it the form desired and set into form by being heated slightly. Now it is ready for carbonizing. This is done by packing the bunches in crucibles with sifted charcoal or other carboniferous substances, and, after sealing, by baking it in a hot fire for 1½ days. When it is taken out every thread is black and shiny and seems to have a perfect surface, but it is not ready for use. Now each filament is taken separately and clamped with each end in a live electric current and while it is immersed in a vapor of gasoline the current is passed through it. The effect is to deposit upon the white-hot filament a coating of lampblack, or carbonized gasoline, which gives it qualities not otherwise obtainable. In the early days of their manufacture only eight 16 candle power lamps could be lit by 1 H. P., but now fifteen are used. The filament is now ready to be mounted in the lamp.

Unlike those fragile filaments which Edison produced, the new ones are handled easily, and, although they break easily when bent sharply, they are so springy that they can be drawn straight out without danger and then allowed to fly back to shape.

With the development of the carbon filament has come a gradual change in all the processes of lamp making, until the price of 16 candle power lights has fallen gradually from $1.25 each to 18 cents; or less when taken by contract in large lots.



Wannicut Lake, Palmer Mountain, Wash.; Wehe Con. Mines Run to Its Shore. (See Page 407.)



Palmer Mountain, Washington, Showing Ground Owned by the Wehe Con. G. M. & M. Co. (See page 407.)

Formula for the Assay of Mercury.

TO THE EDITOR OF "CONCENTRATES:"—In your issue of March 24th you gave a formula for the assay of mercury which can be improved upon. Grateful for the help I have received from your page in the past, I give you herewith an easy method which I am using and which I hope will be useful to your readers:

Put one-half or one gramme, according to its supposed richness, of the finely powdered ore into a common Battersea "C" annealing cup and mix it in the cup with five grammes iron filings, which have been washed with gasoline and heated to redness to rid them of grease, and cover the charge with one gramme of the filings. Set the cup over an alcohol lamp and cover it with a piece of silver foil large enough to leave a small margin outside the edges of the cup. This foil must be first cleaned, heated carefully to redness over the alcohol flame, cooled and weighed. See that it is smooth and fits the cup all around. Place a small glass beaker half full of cold water upon the silver foil to keep it cool. Adjust the alcohol lamp so that its flame point plays upon the bottom of the cup and continue the heat for about fifteen minutes. Change the water in the beaker as it warms, or, better, put in some small pieces of ice. Allow the cup and cover to cool and weigh the silver, any added weight being quicksilver, which can be easily seen on the silver foil, even as little as 0.1%. After weighing, the silver can be ignited to drive off the mercury and used over and over again. This is the method of Eschka, improved and simplified by Chism.

Spokane, Wash., March 28th. C. M. F.

General John Bidwell of California.

The first, the most famous and the greatest of all the princely pioneers of pioneer California, General John Bidwell of Rancho Chico, died suddenly from heart failure on April 4th, and thus came to an end one of the most interesting and picturesque of American careers. He was a contemporary of Godey, Kit Carson, Fremont, Lassen, Sutter, Vallejo. His marvelous and accurate memory held within its grasp an infinite number of details of the past sixty years of Pacific coast development, and his few published documents are among the most precious materials for the historian.

It is interesting to remember that John Bidwell, whose relationship to California began with his remarkable journey across the continent in 1841 (a journey which justly ranks among the most fascinating chapters of pioneer adventure), was ever a hewer of paths, a builder of roads. Last summer he was road building in the Sierras, and when he was stricken down last week it was while he was working on a road. It is largely due to his efforts and his example that Chico is one of the most beautiful of tree-sheltered towns, and that Butte county has many of the best roads in California.

This stately and noble old pioneer, whose name is writ large in the history of California, was a man of the large, simple Homeric type, whose nature fitted



The Late Hon. John Bidwell of Chico, Cal.

well with the great valley-plain of the Sacramento, the snow peaks of the Sierras, the ancient oak forests of his superb estate. There he kept open house for a lifetime, and what a procession of famous men and women have enjoyed the hospitality of Rancho Chico these fifty years! Asa Gray, Sir Joseph Hooker, President Hayes, Gen. Grant and Ralph Waldo Emerson were there, and governors, senators, authors, musicians and artists too many to name in this brief note.

It is not easy to synopsize in a paragraph the salient points of so active a career. One can find it set forth in the newspapers and histories. He was born in Chautauqua county, New York, Aug. 5th, 1819. When he came to California in 1841 there were hardly 100 "foreigners" in the whole region, and this young man of 21 easily and immediately became a leader among them. He seems to have impressed every one, even then, with his honesty and efficiency. He obtained a Mexican grant for Rancho Chico in 1845 and mined great store of gold on Bidwell's Bar in 1848. He was a State Senator in the famous first session; he served in Congress; he was a candidate for Governor in 1875 and for President in 1892; he took a useful and sturdy part in public affairs, battling ceaselessly for better local government, higher education and public rights. He was a pioneer of pioneer miners, with a miner's great heart and lavish hospitality—a "California miner" of the old day.

His services to California have been great. Last Wednesday, the 11th, from Rancho Chico, the home of this large-hearted pioneer, this lover of forests and mountains, this friend of children and Indians and animals, was borne to the grave all that was mortal of this man who was famous among the famous men who laid the foundations of the commonwealth of California.

POVERTY would soon be an unknown quantity if men could dispose of their experience at cost.

Sampling of Copper Ores.

TO THE EDITOR:—Please answer in "Concentrates" as to the manner used by smelters of copper in sampling copper ore sent them in carload lots. Also, what is the best way to know that your ore is given a fair sample? Our ore, to the eye and by assay, has run very well, and so has our sorting; yet, the carload values gradually grow less by the sampling, until ore that ran at first over 40% has gone down below 30%.

We cannot state definitely the method adopted by the smelters for sampling copper ores in the case referred to. Some use an automatic sampler, whereby a certain portion of the ore as it passes through the sampler is diverted for the sample. This portion might be one-fifth or one-tenth, or any other portion desired, depending more or less upon the richness of the ore. Others sample by hand. In sampling ores of ordinary grade, when crushed to the proper size for sampling, a smelter using the hand method would spread the ore on the sampling floor, and then as the pile is shoveled over every fifth shovel is taken for the sample. This fifth is spread on the floor in a flat, circular pile and divided into four quarters by lines crossing each other at right angles. Two opposite quarters are taken for the sample. These two quarters are then put through a crusher, after which they are again quartered down and requartered, by which the bulk is further reduced; then crushed again, and finally twenty or thirty pounds is taken as the final sample, which is then passed through a pulverizer, pulverizing it to a fineness where it will go through a 50-mesh sieve. From this pulverized sample the assay samples are drawn, put in bottles and sealed. It is customary to seal not less than three samples—one being reserved by the smelter, the second given to the owner and a third reserved by the smelter in case an umpire assay is necessary to settle a difference between the smelter and the owner.

If the shipper has doubts as to his getting a correct return for his ore, the best thing he can do is to go in person or send a representative to the smelter, see his ore sampled and get a portion of the sample, which he can have assayed by some reliable assayer. If his assay and the smelters' do not agree, he can then call for an umpire assay, to be made by some assayer mutually agreed upon.

California Quicksilver Mines.

The New Idria, Ætna and Napa quicksilver mines issue annual reports for year ending Dec. 30, '99, as follows:

	New Idria.	Ætna.	Napa.
Sales of quicksilver	$153,898	$120,904	$194,224
Quicksilver on hand Jan. 1, '99, since sold	41,400	35,550	45,225
Totals	$195,298	$156,454	$239,449
Expenses	$ 97,256	$ 86,190	$146,100
Net earnings	101,135	69,057	91,117
Dividends	90,000	50,000	50,000
Surplus	11,135	19,057	1,117

The New Idria expended $13,760, the Ætna $2679 and the Napa $4378 for construction and repairs and charged same to expenses. The Napa company also charged $20,769 for development work to expenses and charged off $1355 for depreciation on buildings.

The New Idria produced in '99 4780 flasks of quicksilver, the Ætna 3450 flasks and the Napa 5850 flasks. Production in '98: New Idria 5000 flasks, Ætna 3450 flasks and Napa 7850 flasks.

General Manager Buckminster says of New Idria: The reduction works have been improved and the ore is being handled very economically with the best results. We have continued to do a large amount of development work, which has given good results, and shows up a good deal of ore in reserve. The work of developing the San Carlos claims at the north end of the property has been actively prosecuted, and we have a good showing of opening up a good mine.

Of the Ætna he says: Operations during 1899 have given good results. The Silver Bow ore body, which has hitherto yielded the bulk of our ore, has been largely worked out to the ninth level, leaving a comparatively small amount of ore in the upper levels; but we are now sinking below the ninth level, endeavoring to trace the ore body down.

THE present mining contest at Butte, Montana, where mining lawyers and mining experts are gathered, lends present interest to the happy hit made by Rossiter W. Raymond at the dinner given in San Francisco, last September, to the visiting members of the American Institute of Mining Engineers, when in response to the toast, "Lawyers and Experts," Dr. Raymond read the original lines now published for the first time on page 400.

Bullion Consolidated Mine, Grass Valley, Cal.

The Bullion Consolidated gold mine is located two and a half miles south of Grass Valley, Cal. For several years development work had been going on quietly at this mine with encouraging results. In June, '99, George Mainhart, who had previously conducted its affairs in connection with other properties of which he was superintendent, took active charge of the Bullion, and he has since inaugurated improvements of considerable extent. The most notable of these is the erection of a 10-stamp mill, shown in the foreground of the accompanying illustration. He has also sunk the shaft 112 feet, making its present depth 930 feet, and has run and extended drifts at different levels to the extent of 2000 feet. He is now driving south on the 900 level in order to strike and develop a shoot of known richness in the old Ione location, this being one of the four claims belonging to the company. The other claims, besides the Bullion, are the Galena and the Union Jack. It is expected that the Ione shoot will be reached in the near future.



Bullion Mine and Hoist, Grass Valley, Cal.

The equipment at the Bullion is now as follows: A steam double-reel friction hoist and a Cornish pump are stationed in the hoisting works. The pump is run by electric power, but has steam attachments in reserve. An air pump for ventilation of the mine is attached to the Cornish pump. The mill was completed in August, '99, and is modern in every respect and so planned that it can be enlarged by an addition to the west when the same is needed. The 10-stamp battery and the four concentrators are run by electricity. The ore, which is now coming mainly from the 700 level, is 5% sulphurets. These are sold to local reduction works or to Selby's. The shaft contains three compartments, two for hoisting and one for the pump column. The strike of the vein is north and south, and it dips to the east at an inclination varying from 15° to 20°. The vein is from 2 to 4 feet wide, in granodiorite. The mine makes considerable water, but this is easily handled by the pump, which, at seven strokes, raises 350 gallons per minute.

The principal stockholders in the Bullion are business men of San Francisco and Sacramento. The superintendent, George Mainhart, has long been a resident of Grass Valley and has been identified with prominent mining enterprises. Under his management strong hopes are centered in the Bullion.

Grass Valley, March 18. H. G. P.

COLORADO MINING MEN are discussing the problem of obtaining mining timbers, as the supply of heavy mine timber for square sets and other underground work is comparatively limited. The land office has tightened the screws considerably of late, and it is believed that ultimately the advance in timbers will be more than the mines can stand. It is figured that in shaft sinking where 6 feet square sets are used the cost will be increased by $5 per foot. Congressman Lacy has introduced a bill framed in accordance with recommendations of the General Land Office, revising the existing statutes relating to the disposition of timber in the public land States. The measure authorizes free use of timber by miners, prospectors and bona fide settlers on their own claims and farms, and provides that the Secretary of the Interior may sell so much of the timber growing on the public lands as may be necessary for the use of persons dependent on timber in settling the country and developing and maintaining its resources.

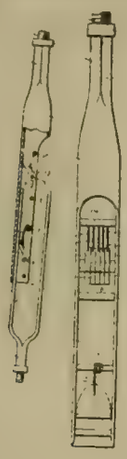
MINERS are reaching Lake Superior copper and iron districts from the Transvaal. These men average exceptionally high, having been employed at wages averaging upwards of £1 per day in the gold mines of Johannesburg. The new comers from South Africa are nearly all British sympathizers and are not hopeful of an early settlement of trouble now agitating the Transvaal. The number of these miners reaching Michigan mining camps in the past few weeks exceeds 100.

Mining and Metallurgical Patents.

Patents Issued April 4, 1900.

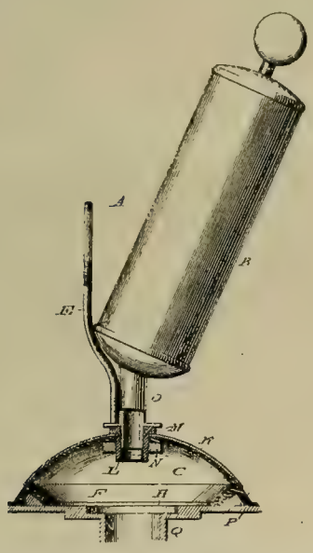
Spec'ally Reported for the MINING AND SCIENTIFIC PRESS.

OIL WELL TOOL.—No. 646,422; C. R. Fisk, Cecil, Pa.



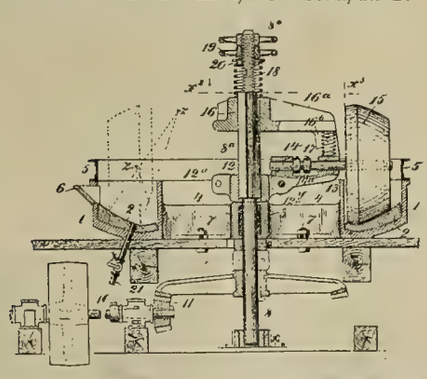
A tool for removing sucker rod straps from oil wells consisting of hollow tubular socket provided interiorly with series of upper and lower pins extending laterally therethrough, a pawl mounted upon center pin of lower series of pins, a spring mounted upon pin above pawl, the free end of which is adapted to bear against pawl, a series of pawls independently mounted upon center pin of upper series of pins, and a series of springs mounted upon pins above pawls, the free ends of which are adapted to bear against pawls.

LIFT AND FORCE PUMP.—No. 646,455; E. Noppel, Philadelphia, Pa.



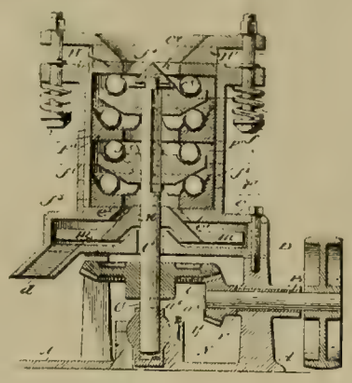
A combined force and suction pump, pumping device, cup provided with yielding bifurcated open end, a strengthening or stiffening cap over body portion of cup, outer edge of cup being situated at juncture of bifurcations of cup, the pumping device having a flanged and threaded nipple, a cup having an exteriorly and interiorly threaded headed sleeve within opening, and a nut upon sleeve, the cup being held between head of sleeve and nut, sleeve receiving nipple.

GRINDER FOR CRUSHED ORES, ETC.—No. 646,484; J. F. Wiswell and F. B. Smith, New York, N. Y.



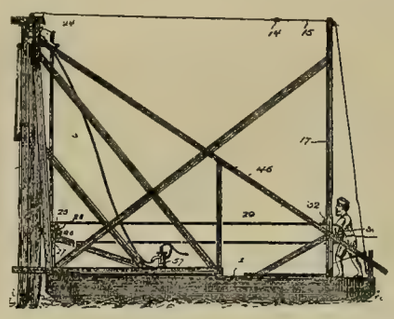
In an apparatus for the purpose specified, the combination with the trough or bed, upright driving shaft 8, and grinding rolls, of the boss 12 on the shaft 8, the bearing blocks 13 hinged thereto, the longitudinally slidable, radial roll shafts 14, mounted in the bearing blocks 13, the spider, having a boss 16, arms 16ª, and pairs of pendent cheeks 16ᵇ embracing the respective blocks 13, spider being slidable on but rotative with shaft 8, springs 17, between arms 16ª and respective bearing blocks, the spring 18, on the upper end of the shaft 8 and pressing on the boss 16, and nuts on the upper end of the shaft 8 for regulating the tension of the spring 18.

PULVERIZING MILL.—No. 646,507; T. J. Sturtevant, Newton, Mass.



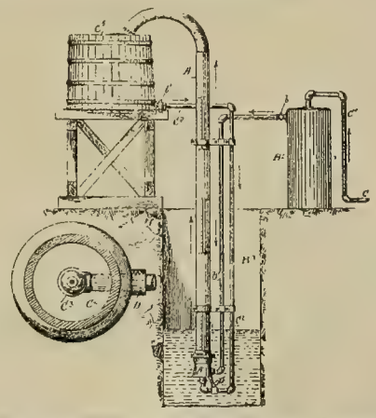
In a pulverizing mill, the combination with tube or casing the interior of which affords a pulverizing chamber, of plurality of superposed alternating rotating and non-rotating races within chamber, each race being provided with circular series of pulverizing balls, each race supporting weight of balls and races above it, and discharging the crushed material on the race beneath it, a lower chamber beneath pulverizing chamber for receiving pulverized material and provided with a discharge opening, and rotating scrapers within lower chamber for conveying pulverized material to discharge opening.

DRILL GOLD DREDGE.—No. 646,532; S. Babare, Tacoma, Wash.



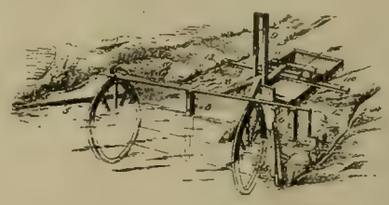
Combination with float, of a dredging cylinder mounted thereon, having series of projecting ribs on its lower portion, extending below ends of cylinder to form digging points, gearing for rotating cylinder, comprising spur gear upon upper end of cylinder, spur gear meshing therewith sliding upon a squared shaft, latter gear having peripheral projection adapted to engage peripheral groove upon cap piece of cylinder, whereby the two gears will be kept together when cylinder is raised or lowered, means for rotating squared shaft, and means for raising and lowering cylinder.

AIR LIFT PUMP.—No. 646,640; G. H. Evans, Oroville, Cal., assignor of one-half to the Risdon Iron and Locomotive Works, San Francisco, Cal.



In an air lift pump combination with discharge or column pipe having an inlet opening in its base, and a series of air jet openings above inlet opening, means for forcing air through the jet openings, a tank above the pump and into which the pipe discharges, and a hydraulic water supply pipe leading from the tank to the base of the column pipe having an upturned nozzle on its lower end arranged in line with the interior of the column pipe for the purpose specified.

HYDRAULIC DREDGE.—No. 646,769; S. C. Swarts, Rangely, Colo.



A hydraulic dredge, consisting of means for damming the stream, adapted to be moved forward in an upright position by the pressure of water against it; a floating guide for holding damming means in an upright position as it moves along the stream; dredging plows disposed in a plane below the bottom of damming means and secured thereto, plows being adapted to travel over bed of creek and hold lower end of damming means above bottom of creek, to provide for passage of water between plows and damming means to disintegrate dredged particles as damming means is carried forward by hydraulic pressure.

METHOD OF EXTRACTING GOLD AND SILVER FROM THEIR ORES.—No. 646,808; T. Cruse, Helena, Mont.

Improved process of recovering precious metals from their ores, which consists in reducing the ore to a pulp, adding cyanide of potassium, adding to the mass bluestone to precipitate the aurous and silver cyanides, then adding a reagent to precipitate the precious metals which may remain in solution after the precipitation of the aurous and silver cyanides, then decomposing the precipitated cyanides to free the precious metals, then extracting the precipitated metals.

PROCESS OF HARDENING STEEL.—No. 646,528; C. G. Meissner and R. Bennewitz, Magdeburg, Germany.

Process of hardening steel, consisting in cooling the heated metal in a bath composed of about three parts of water and one part of a mixture composed of zinc white, charcoal dust, leather liquor and petroleum.

The Telluride, Colorado, Folio.

The United States Geological Survey has just published folio 57 of the Geologic Atlas of the United States, relating to the Telluride quadrangle, in the San Juan mountains of southwestern Colorado. This folio differs from the earlier ones in that the descriptive text, 17½ pages, is practically a full report upon the geology of the quadrangle, not a condensation from such a report. The text is in two parts; the first, by Whitman Cross, relating to the general geology of the quadrangle; the second, by C. W. Purington, referring to the economic geology. The latter is an abstract from the detailed report in the Eighteenth Annual Report of the Survey, Part III. The folio contains, basides the descriptive text, a topographic map; a geologic map in strong colors; an economic map in lighter colors, showing the principal mines and ore veins, auriferous gravels, etc.; a structure-section sheet, representing the inferred relations of the formation below the surface; and three sheets of views from photographs, illustrating the physical features of the region which are described in the text. The Telluride folio is the first of a series to be issued representing the geology of the San Juan region; of these, the La Plata folio is in process of publication and will be issued during the present year. The price of the Telluride folio is 25 cents. Payment should accompany order, and should be made by postal or express money order or in cash (not stamps or check)—the exact amount. All communications relating to publications should be addressed to: The Director, United States Geological Survey, Washington, D. C.

SEVERAL bills introduced in Congress have been referred to Commissioner Herman of the General Land Office for his judgment as to their merits. One of these provides that exclusive leases for mining purposes may be granted to lands within the territory of the United States which lie below high water mark. It is proposed to grant exclusive leases upon condition that a bond of $5000 be given to insure proper fulfillment of the agreement. Commissioner Herman reports adversely on this bill for the reason that, while Cape Nome is not specifically mentioned in it, the evident intent is to make it apply there. It is held to be contrary to the policy of the United States Government to grant exclusive leases of this character to gold fields, and the proviso in regard to a $5000 bond would operate to exclude poor miners from securing grants.

Coolgardie, Aus., Water Pipe Line.

In the MINING AND SCIENTIFIC PRESS of March 12, 1898, appeared a technical article on a proposed Australian hydraulic enterprise, which, from its magnitude, was attracting universal attention, involving the construction and placing of 328 miles of 30-inch steel pipe, to daily deliver 5,000,000 gallons water, at an original cost of about $10,000,000.

In continuation of the extended discussion of the project in the article referred to, it may be said that the committee appointed to investigate and report did so, and from the Engineering Record it is learned that, as a result of such investigation and report, the works are now under construction.

There are some changes and modifications in the original plan. The one thing that aroused the most surprise was the recommendation that the pipe be laid upon the surface of the ground. This plan the engineers in charge propose to carry out, expecting by the special construction of the pipe to overcome the manifest difficulty because of strain, etc., occasioned by a climate where the temperatures are so extreme.

With a change of temperature of 75° Fahr., the amount of expansion to be provided for is about $\frac{3}{8}$-inch for every 100 feet length of pipe. But this amount was thought likely to occur only if the pipes are emptied during extremes of temperature. Special joints to allow for expansion and contraction were recommended.

In a pipe line of such extreme length the question of leakage is important. Small leaks from the joints and rivets of steel pipes, subject to strains caused by contraction and expansion, are certain to occur. If detected early, they are not difficult to repair; but below ground it was thought that individual cases would be difficult to detect. It was because of this that the engineers recommended that the pipe line be laid on the surface of the ground, thus furnishing greater facility for the inspection of the pipes and the suppression of leakage. Other reasons favoring this decision were the decreased cost and the fact that the soil along a large part of the line contains much salt. There is no prolonged frost to trouble the pipes and no difficulty is apprehended in protecting them from wanton injury.

The method of fixing the main on the surface of the ground was considered by the commission of engineers. They recommended that the pipes be supported on timber bolsters, or sleepers, the upper sides of which would be hollowed to a depth of not less than 6 inches to fit the under side of the pipe. So placed, with expansion joints every 120 feet, the pipes would offer but little resistance to motion and creeping might occur unless prevented. Also, in all curves the joints would have a tendency to move radially from the center of the curve. With a 30-inch pipe under a head of 400 feet and laid on a curve having a radius of 660 feet, the radial thrust on each length between the expansion joints is given at about nine tons. In the event of the sudden closing of a valve this pressure might be much higher. It is essential that both the tendency to creep and to move at the curves should be effectually counteracted. To prevent such movements the commission recommended flanges on the under side of the pipe to bear against piles or a mass of concrete, and piles or concrete blocks on the outer side of the pipe on curves.

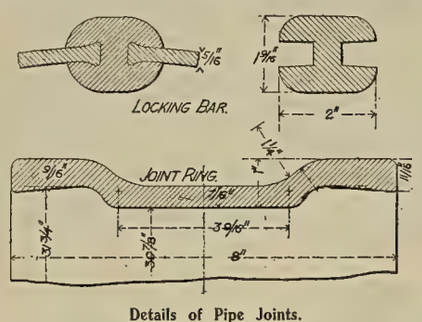
The engineers recommended that the pipe line should be made up of riveted steel pipe 31 inches in diameter, made of plates $\frac{3}{16}$-inch to $\frac{5}{16}$-inch thick, and of lap-welded pipes from 26 to 29 inches in diameter. The friction head in such a pipe line is about 1300 feet, making the total head, against which the water will have to be pumped, about 2600 feet.

Bids were received for 246 miles of 30-inch riveted pipe and 82 miles of 26 to 29-inch welded pipe in London and Perth. The former were higher than the estimated cost, the latter were lower. The latter, however, substituted for the welded pipe a type of pipe having a patent locking bar joint, the design of M. Ferguson of Perth. This pipe is made of steel plates fastened together with two longitudinal joints made by swelling the longitudinal edges of the plates and bringing them together in grooves made in the opposite sides of a bar. The bar is then closed onto the swollen edges of the plate by pressure.

A pipe of this kind had been previously tested by W. C. Unwin. Strips with the joint in the middle of each were cut from the pipe and tested. In five out of six tests the strips broke through the solid plate and not at the joint, while the remaining strip broke at the joint. A piece of pipe 4 feet long, 12 inches in diameter and $\frac{1}{2}$ inch thick, having two of these patent joints, was also tested by hydraulic pressure. An internal water pressure of 800 pounds per square inch was applied before the test was stopped by leakage at the ends, which had nothing to do with the construction of the pipe. Subsequently a pressure of about 850 pounds per square inch was put on before leakage again stopped the test. In a third test the pressure momentarily reached 900 pounds per square inch. The pipe was bulged, but there was no leakage at the longitudinal joints and they did not appear to be injured.

There were two bids received at Perth, one by Messrs. G. & C. Hoskins for the riveted pipe, the other by M. Ferguson for his patent locking bar pipe in place of the welded pipe. In view of the fact that the total of these two bids was considerably below the estimated cost, it was thought desirable by the chief engineer to have all the pipes 30 inches in diameter instead of some 26, 27½ and 29 inches, as specified. It was also thought desirable to have the two bidders unite and supply the whole of the pipe of the locking bar type. They were also requested to furnish a bid providing all the pipe, excepting 1000 lengths, which were to be of plates $\frac{5}{16}$ thick, of plates ¼ inch instead of a portion of plates $\frac{3}{16}$ inch thick. It was estimated that the adoption of this type of pipe and the increased size would, by decreasing the friction, reduce the cost of pumping by about $50,000 per year. The total revised bid was about $5,000,000 and was still about $350,000 under the original estimate. This figure was merely for furnishing the pipe without joints or valves, and did not include any price for laying. The contract was awarded half to G. & C. Hoskins and half to M. Ferguson, and called for pipes of the locking bar type. A contract for one-half the required number of joint rings was also awarded to each bidder.

The pipes are to be furnished in lengths of 28 feet, each length to be composed of not more than two plates and two longitudinal locking bars. The specifications require that the locking bars for the pipes made of ¼-inch pipe shall weigh not less than 6½ pounds, and those for the pipes made of $\frac{5}{16}$-inch plate not less than 7¾ pounds per linear foot, unless it is proved that such weights can be reduced without any risk of impairing the efficiency of the joint. The lengths of pipe are to be jointed together by means of the welded steel rings shown in the illustration.



Details of Pipe Joints.

When considered desirable by the engineer anchor plates consisting of three 12-inches pieces of 6x4x⅜-inch angle iron shall be double riveted to the pipe, 3 feet from one end of every fourth length.

The specifications require that the plates and bars shall be made of open-hearth acid steel, and the plates shall be capable of withstanding a tensile strain of not less than 25 nor more than 29 tons per square inch, with an elongation in 10 inches of not less than 20% and a contraction of area of not less than 45%. The steel must also resist the following drifting test: A hole ⅝ inch in diameter to be punched within 1¼ inches of any edge of a plate and to be drifted out, cold, to a diameter of 1⅝ inches without showing signs of fracture. Not less than two tensile tests will be made from each cast, and bending and drifting tests will be made from each plate. The pieces must bend cold around a bar of a diameter three times the thickness of the plate, without signs of fracture. The locking bar joints are to be fully as strong as the plates.

Before the longitudinal joints are made, the locking bars and the edges of the plates are completely freed from black oxide by being dipped in a bath of dilute sulphuric acid and then in a bath of lime water, followed by scrubbing, if necessary. This is done under cover and the plates and bars are not exposed to the weather after dipping, but are at once formed into pipes. The pipes are then submitted to hydraulic pressure of 400 pounds per square inch and also to smart tapping with a hammer while under pressure. After they have been tested and approved by the engineer they are dipped in the baths of dilute sulphuric acid and lime water, and when thoroughly clean are coated with a composition of asphalt and creosote. The pipes are heated uniformly to about 300° Fahr. and are dipped into the composition, which is kept fluid at a uniform temperature. They are left in the bath long enough to acquire its temperature, and after removal are suspended until the excess of coating has drained from them.

The commission of engineers recommended various valves for different points on the line. Stop valves are to be used at the inlet to each reservoir, at the outlets of the pumps, at every important depression, and generally at points not exceeding five miles apart. Scour valves, having openings 6 to 9 inches in diameter, are to be placed on pipes connected with the under side of the main at every depression. Back-pressure valves are to be provided at the inlet to each reservoir and immediately above each pumping station. There are to be air valves at all summits on the line to liberate air when charging the main and to keep it free from air disengaged from the water flowing into it. These are to work automatically and will be placed in groups of three and four in one casing and have a considerable discharging capacity. They are to be protected by a strong cover from the possibility of interference or injury. They will also admit air to the main in case the pressure in it falls below that of the atmosphere. To prevent the air from being carried past these valves by the flow of the water, the commission recommended the provision of air domes consisting of 12-inch cast-iron pipes, 18 inches in depth, with flanges fitted to the crown of the main. Immediately above each dome should be fixed a 3-inch stop valve, and above that the air valve proper. Instead of cutting a 12-inch hole in the main, it should be perforated with numerous smaller holes. In addition to this, at the most important summits, about sixteen in number, the commission recommended enlargement of the main to about twice the normal diameter, thus forming chambers in which the velocity of the water would be reduced, and where the air or gas could freely disengage itself from the water and escape by the air valves.

There are to be eight pumping stations; one at the Greenmount reservoir, the second is a short distance from it, the others at various points along the line. On most sections of the line, it happens that there is high ground at a short distance, compared with the length of the section, from the pumping station. Up to this high ground the pumping main from each station will always be under the pressure due to the altitude and the friction. From this elevated point, however, the flow to the next pumping station will be by gravity. This portion of the pipe line will ordinarily be under the pressure due only to the elevation and the hydraulic gradient.

There is one section requiring special treatment. If the section between the second and third pumping stations were treated similarly to the rest, the closing of the stop valve at the third station would place about thirty-six miles of the main under a head of 450 to 650 feet. In order to reduce this head about 200 feet, a reservoir is to be built on high ground near the thirty-third mile of the line. This is to have a depth not less than 25 feet and a capacity not less than 6,000,000 gallons. The pipe line is to be broken at each pumping station by the insertion of a reservoir having a depth of at least 20 feet and a capacity not less than 2,400,000 gallons, into which the water will flow and from which it will be pumped into the next section of the line.

The location of the eight pumping stations along the line, as recommended by the commission of engineers, is such that the head, against which the water will be pumped, will be the same at each of the first four and also at each of the second four. By this arrangement there will be a great uniformity of the pumping machinery, there being but two sizes of steam engines proportioned to the two different lifts. This uniformity was considered desirable. As to the type of pumping machinery, triple-expansion engines with surface condensers were recommended. Both direct-acting engines without flywheels and engines with flywheels were considered suitable for pumping into the long pipe line. It was thought desirable, under the conditions in Western Australia, to sacrifice a little in economy of coal consumption, if by so doing a considerable gain in the simplicity of the engines could be obtained. Many questions regarding the pumping machinery were left to the manufacturers who might present bids for the same. Each station is to have a reserve for use in case of accident.

At present the excavation for the foundation of the dam on the Helena river, amounting to 50,000 or 60,000 cubic yards has been completed. The delivery of the pipe under contract has begun. Bids for supplying the pumping machinery to the extent of about 6000 H. P., which is about double the amount required for daily work, have been received. This work is being carried out under the direction of the Public Works Department of Western Australia. The total cost of the project is estimated to be about $12,000,000.

At Coolgardie there is to be a service reservoir having a capacity of at least 24,000,000 gallons. In the future it may be necessary to construct another reservoir about four and a half miles from this one and 170 feet higher. An additional pumping station will be required for this, but both this reservoir and pumping station have been left for the future and are not included in the present project. A number of smaller service reservoirs at points along the line were included in the project, as were also 100 miles of 12-inch distributing mains at Coolgardie.

The difference in level between the Greenmount reservoir and the service reservoir at Coolgardie will be about 1300 feet, and it was assumed by the commission of engineers that the whole of the water would be pumped to this height.

AT Leadville, Colo., last week, the jury in the case of Theodore Craig, charged with larceny, brought in a verdict of guilty. Craig was a shift boss at the Ibex mine and the evidence produced showed that he had been systematically stealing valuable ore from the company's ground. One sack of the ore weighing seventy pounds was found in his cabin, and other ore which he had taken was melted down, producing gold to the amount of $110. In addition, $300 worth of gold ore was found in his possession.

MINING SUMMARY.

ARIZONA.

GILA COUNTY.

The Silver Belt says there is a better feeling apparent in Globe on account of the arrival of coke for the Old Dominion company, and the prospect of the early resumption of smelting.

COCHISE COUNTY.

At the copper property of Dos Cabezas Con. M. Co. the Foreman tunnel is in 175 feet. In the Roberts tunnel the ore chamber is 50 feet wide. A site for a smelter has been selected. The new town will be called Laub City.

SANTA CRUZ COUNTY.

(Special Correspondence).—The mill at the Tres Amigos mine has been shut down for a week on account of breaking the cam shaft, but that is replaced and operations resumed. The cyanide plant is now running in good order. The mine is looking well. The drift on the 130-foot level is 600 feet long with crosscuts every 100 feet, cutting the ledge 20 feet over all in ore. Assays taken the full width of the drift go $190 per ton.

Tres Amigos, April 5.

CALIFORNIA.

AMADOR COUNTY.

Record: J. Ross, Jr., and T. E. Thompson have sold the Hayden Ranch mine to a German company. It adjoins the Baliol mine on the north.——At the Lincoln mine crosscutting continues at the 1200-foot level.——A. McWayne has made arrangements to sink the shaft of the Pocahontas mine 400 feet deeper.

CALAVERAS COUNTY.

F. J. Solinsky is president Ford M. Co. They propose putting in an electric pumping plant, sinking the shaft 1000 feet and drifting southwardly, the cost not to exceed $30,000.

The Thorpe mine is not to reopen under the management of an English company, as previously reported.

EL DORADO COUNTY.

E. W. Claresse has charge of operations at the Montezuma mine at Nashville, where machinery for sinking has been placed.

FRESNO COUNTY.

The Yellow King M. Co. has incorporated at Fresno; capital stock, $25,000, subscribed in full. Directors—C. S. Cox, L. L. Cory, T. G. Hart, M. Webster, W. H. McKensie.

KERN COUNTY.

At Randsburg the pumping plant and pipe line from the wells at Goler to the Yellow Aster mill cost $55,000. A contract for doubling the capacity of the mill, making it sixty stamps, is expected. The new reservoir at the mill is 100 feet long, 20 feet wide, built of solid masonry and will hold 100,000 gallons.

MARIPOSA COUNTY.

(Special Correspondence).—The Columbus M. Co., near here, has bought a 20-stamp mill. It will be run by water power.

Coulterville, April 10.

NEVADA COUNTY.

(Special Correspondence).—Washington is on the South Yuba river, nineteen miles northeast of Nevada City. Its inaccessibility militates against its enterprises, it being remote from railroad facilities and cursed with bad wagon roads. Besides various prospects, the only properties which are being developed or worked at the present time are the Gaston Ridge, Eagle Bird, Gray Eagle, Champion, German and El Capitan.

The Gaston Ridge was formerly known as the California. It is four miles north of Washington. Work at the mine is being actively prosecuted. A crosscut tunnel 2300 feet in length has been run into the hillside, tapping a ledge of metamorphic slate varying in thickness from 4 to 20 feet. A winze extends 100 feet below this station. Although there are rich streaks of ore in the ledge, it is not a high grade proposition when worked as at present, the entire ledge being put through the mill. The ground breaks into large chunks, and before being sent to the mill it is run through a primary rock breaker, with jaws set wide apart; thence it is hoisted to the top of the mill and there goes through another rock breaker of the ordinary type and is reduced by 1100-pound stamps dropping ninety-six times per minute. There are twenty stamps in the mill. The ore is hauled from the mine by mule power in trainloads of seven to ten cars. These cars are side-dumping. In the mill a dumping device invented by Supt. Harmon is used. At the waste pile the dumping chair invented by Wm. Hogan of Washington—fully described in the MINING AND SCIENTIFIC PEESS of March 24th—is employed. The side-dumping car is used on account of the coarseness of the ore, and the dumping devices are resorted to in order to effect saving in time and muscular energy. From fifty-five to sixty tons of ore per day are crushed. Water is the motive power employed, it being taken from the North Bloomfield Co.'s ditch and delivered to the Pelton wheels under a fall of 400 to 460 feet. Two Rand air compressors, with automatic valves, are direct connected to a 15-foot water wheel. The rock breaker and the mill have each a separate water wheel. The concentrators and blower are run by water which flows from the mine. This is a large stream—fully 50 miners' inches. The machine shop and the stock of bar, round and flat iron are unusually complete, the remoteness of the mine from repair shops making these equipments a matter of wise precaution. About forty-five men are employed. Dana C. Harmon is superintendent, H. L. Johnson foreman.

At the Eagle Bird mine at Maybert, seven miles above Washington, the 800-foot shaft follows close to the ledge, at an inclination of 80°, with stations at every 100 feet. There are 1600 feet in drifts. The vein formation lies between granite walls. At places it is 40 to 50 feet wide, in which cases it consists of slate and schist intermingled. Where the ledge narrows down to 5 or 6 feet it is all quartz, though there are places where the solid quartz formation is 25 feet thick. The ore is not high grade, but under present management the mine is run at a profit to the stockholders. The company brings water three-fourths of a mile through its own ditch along the bank of the Yuba river, securing a fall of 180 feet at the works. The double-reel hoist, the air compressor and the 30-stamp mill are all run by this power. The ore is so lightly sulphuretted that no concentrators are used, the two that were in the mill having been discarded. The ore is crushed fine enough to go through a 30-mesh wire screen. About fifty-five tons per day are reduced. At present a day shift only is given employment, consisting of fifteen men. W. M. Wilson is superintendent.

The Gray Eagle mine is being developed by J. G. Cohoe, who has a bond on the property. An air compressor, run by water under 500 feet fall, is the present extent of machinery employed. A tramway had to be built before the heavy parts could be elevated to the mine.

The Champion Consolidated, near the Gray Eagle, is a promising claim and has been considerably developed by tunnels. Tunnel No. 2, where work is now being vigorously prosecuted, was driven 250 feet to the ledge, and drifts thereon are now being run. The ledge is from 1 to 3 feet in thickness. Work is also being done on tunnel No. 3. The ore is free milling and of fair grade. It is in contemplation to erect a mill. J. B. Tully is the foreman.

At the German mine, three and one-half miles east of Washington, little is being done. It is in contemplation to resume operations. There are two tunnels on the property, the lower being nearly 800 feet in length. There are ore chutes building from the mouths of the tunnels to a 10-stamp water power mill. The vein averages 5 feet or more. It is a free milling proposition, there being no concentrators in the mill. Many of the stockholders in the German are also interested in the Gaston Ridge mine, previously described. They have declined to sell the German, but prefer to work their property. M. D. Cooley has charge of the mine.

E. T. Worthley of Washington is developing the El Capitan. Like the Giant King and some other claims in the vicinity, there is here a large ledge of mineralized quartz—from 30 to 100 feet wide. It is, of course, low grade, and the question to be solved is whether it carries ore shoots of sufficient richness to warrant reduction. Mr. Worthley has driven a crosscut tunnel 365 feet into the hill and within another 100 feet he hopes to strike the ledge, upon which he will drift to find an ore shoot which crops out at the surface.

A few of the hydraulic gravel mines located on "The Ridge" in Nevada county, which were several years ago restrained in their operations by injunctions from the courts, are now able to resume work in a modest way after constructing restraining dams to hold back their debris. The most extensive of these is the Bull Run gravel mine at Relief Hill, operated under permit by Penrose & Harker. They have constructed a dam near the South Yuba river, a mile or more below their works. By an ingenious arrangement the tailings are run through grizzlies, by which stones or boulders from the size of a hen's egg up are rejected and automatically dumped into an adjoining ravine, not being carried to the restraining barrier. At the mine water under 200 feet pressure is projected against a bank 80 feet high, in which there is gold from the grass roots to bedrock, the heavier gold being contained in a stratum of blue gravel at the bottom of the deposit. The mine is expected to pay very well this season. About twenty men are employed.

The Union gravel mine, a drift proposition, is giving employment to fifteen men at Relief Hill. A tunnel 3700 to 3800 feet in length has been run into the gravel deposit of the old Eureka hydraulic claim. The ground is breasted out to a depth of 6 to 9 feet next to the bedrock, and without being crushed the gravel is dumped into sluices and the gold caught in riffles. Ordinarily fifty to sixty carloads per day are mined, though the swelling ground makes operations difficult and dangerous. At present considerable prospect work is being done. Chris Jepsen, J. P. Jepsen, C. Jorgensen and others of Relief Hill are identified with the work.

The Waukesha gravel mine (drift) of Relief Hill has a tunnel 2000 feet in length. At the face of this there is an incline of 200 feet, and then another drift 200 feet feet long to tap the gravel deposit. A hoist run by water is stationed at the top of the incline, and from these the ore is hauled into daylight by mule power. The gravel (100 cars per day) is washed twice, without being crushed, and pays about 80 cents per car. Fourteen men are employed, of whom John R. Jones, John P. Jones, Jas. Cameron, Wm. Myers and W. O. Williams are interested partners.

The Blue Lead gravel mine (drift), also at Relief Hill, is being slowly developed by the workmen, engaged upon contingent wages. They are earning $2.50 per day, but are entitled to $3 per day if they can make it out of the mine. Many think the main channel under the ridge runs through Blue Lead ground, and the prospect work is expected to reveal its location. A. Roach, postmaster at Relief Hill, is one of the principal stockholders in this property. Other local people are interested.

Nothing is being done in the North Bloomfield gravel mine, the courts having enjoined operations even after the elevator process was designed and put into execution under heavy expense. At the Malakoff, ten men are prospecting for the development of a profitable drift mine.

The Eureka Lake & Yuba Canal Co., Consolidated, have a permit from the Debris Commission to construct a dam, and this will enable them to work their gravel deposit near North Columbia (Columbia Hill) by the hydraulic process. It is expected the dams will be completed by June 1st. They will employ twelve men. Water will be projected against the bank under a head of 200 feet.

The Badger Hill M. Co. are running monitors at Badger Hill, near the old town of Cherokee, under permit from the Debris Commissioners. They have laid a new pipe line 4500 feet in length, and have thus secured a head of 250 feet. They have good ground, left after extensive operations were discontinued here twenty years ago. J. P. Myers is superintendent of the work.

The Reddik drift gravel mine is on the ridge two miles north of Nevada City. After sinking an incline shaft 550 feet deep, and running proper drifts, the company had begun one year ago to extract paying gravel. At this point their operations were blocked by an uncontrollable flow of water. It was found necessary to alter their pumping arrangements. By lowering the Cornish pump and pumping water into the drain tunnel, 90 feet from the surface, they were able to control the flood. They have now begun again the taking out of good gravel, raising from 160 to 200 carloads per day. This is run through a 10-stamp mill, provided with ordinary plates, and is then conducted into sluices. It is paying well. The machinery is all run by water, but there is a steam plant in reserve. About thirty men are employed under the superintendence of Wm. Graham, with J. T. Lindsey as business manager. Messrs. Fletcher, Kidder and Brown, of the Narrow Gauge Railroad, are principal stockholders.

Geo. W. Downey of Nevada City is considering working by the cyanide process 7000 tons of tailings left by the old Maltman-Crosby chlorination works at Gold Flat. He has a bond on the tailings and is sampling them.

Nevada City, March 25. H. G. P.

In the suit of Yuba county vs. the Kate Hayes M. Co., operating the Kate Hayes hydraulic mine, near Sweetland, an injunction asked by the plaintiff was made permanent in the Superior Court at Marysville this week. The attorney for the defendant made no opposition to the granting of the injunction.

PLACER COUNTY.

Near Lincoln the W. D. Spike mine, an old mine with a new name, is to have a mill, hoist, cable railway and automatic cars. The lead is cemented, showing a heavy wash. The gravel is thrown upon a grizzly. The finer portions fall through a screen, the coarser falling in a rock crusher, and so on down through a succession of screens until both kinds reach the rollers and are reduced to pulp. Tests show that the gravel averages $5 a ton; 125 tons a day is the estimated capacity of the plant. The mill will be run by an engine fed by crude oil, but electricity is to be the motor power. The cap of hardpan obviates timbering. The channel at present is 5 to 6 feet deep and pitching.

SAN BERNARDINO COUNTY.

Seventy miles south of Needles, C. H. Gray is developing the Arica, a free-gold proposition. The mine is in a ledge with a 2-foot pay streak of $100 rock. Three stamps pound out enough gold to maintain a developing force of twenty men.

SANTA CLARA COUNTY.

Bradford Quicksilver M. Co. has incorporated at San Jose; directors, H. R. Bradford, S. T. Kennedy, R. F. Kennedy, H. Fessler, J. Treadwell; capital stock, $500,000; subscribed, $336,500.

SHASTA COUNTY.

(Special Correspondence).—The Evening Star mine, in Old Diggings district, continues ore shipments of good grade. The owners will run a new tunnel below present operations 1000 feet long. The average grade of ore shipped from this mine runs $40.

The Minnesota mine is making regular shipments. On this property, long abandoned, extensive development goes along with reopening the old work.

A shipment of high grade ore was made last week from the Spotted Horse mine at French Gulch.

At the Black Spider mine a horizontal engine and blower are being placed. The shaft is 110 feet deep. A station has been cut and drifts are being run on the ledge, both north and south, and sinking the shaft continues simultaneously.

The Bennington mine, also among the abandoned properties until recently, made a four-carload shipment last week, one of which was high grade. When I speak of high grade ores I mean a value of from $200 to $400 a ton. The Bennington is also furnishing forty tons of quartz a day to the Keswick smelter.

Lawry & Holman have put ten men to work to take out from forty to fifty tons of quartz per day for fluxing, to be shipped to the smelter at Keswick.

At the Bully Hill mines, Captain De Lamar's property, preliminary work is in progress on roasting stalls, smelter building and tramway. About twenty-five men are at work in the mine, and as many more on the surface work above referred to. A new townsite is being surveyed adjoining the smelter site, to be known as Sallee. So soon as accommodations can be provided, it is assumed that the labor force will be largely augmented, but it is premature for men to come here expecting employment.

Redding, April 10.

TUOLUMNE COUNTY.

(Special Correspondence).—C. S. Long, Pres. Tri-Color M. Co., is back from San Francisco, where he arranged for a compressor and hoist capable of power to sink 1800 feet if necessary. If present crosscut developments warrant, the 20-stamp mill will be doubled this summer.

Tuttletown, April 12.

The Densmore mine, near Columbia, recently reported sold to Hayward & Lane, has not been sold, and is not for sale at present.

The Santa Ysabel G. M. Co. will meet at Cheyenne, Wyo., on April 30th, to carry out the plans of the management and the committee of stockholders to assess the stock $1 per share under a reorganization.

El Tarantula M. Co. has incorporated at Stent; J. H. Dull, C. C. Mathews, H. C. Dorrah, H. M. Pease, W. M. Webster; capital stock, $500,000; subscribed, $50.

COLORADO.

CHAFFEE COUNTY.

At Granite, the Cache creek placer property has begun work earlier than heretofore, and, if the water supply holds out, the company expects to clear up $100,000 this season. When the new ditch from above Twin lakes is completed, the company will have water enough to run four giants continually.

CLEAR CREEK COUNTY.

(Special Correspondence). — The Main Trunk shaft has been retimbered and sinking from the present 600-foot level is to be resumed. An air compressor is to be put in to facilitate the work. A connection will be made with the Newhouse tunnel.

The Newton mill treats 100 tons of ore per day and has 2000 tons on hand.

Idaho Springs, April 8.

At Idaho Springs the Stanley mine has been bought by T. J. Chisholm for Montreal men. The first payment of $200,000 has been made, the remainder of the $1,500,000 to be paid within six months. Work on a 100-ton concentrator began. C. A. Gehrmann is Mgr., J. Bowden

Supt. There are thirty-five patented claims in the group, covering 100 acres. Water rights are owned for one mile along Clear creek. This power is used in running a small mill, eleven air drills in the mine and two pumps. The air compressors have a capacity for operating forty drills in addition to the pumps. The ore reserve is said to be unusually extensive.

EL PASO COUNTY.

Contracts involving $500,000 have been let by the Standard M. & S. Co., for a reduction plant at Colorado City within the next six or seven months, capacity of 400 tons per day, to be in operation December 15, 1900.

FREMONT COUNTY.

At Bare Hills a new mill is just finished for the Mount Pisgah M. & M. Co. by Mgr. Coolbaugh, five stamps of 850 pounds each. The water is forced by a 6 H. P. gasoline engine 3000 feet to an elevation of 135 feet.

LAKE COUNTY.

(Special Correspondence).—An important strike was made in the Revenue shaft on Rock hill on the 5th inst. At 535 feet depth a blue lime contact was encountered, containing a body of ore running three ounces silver to the ton. This is considered proof of the contention that the ore zone of the down-town section of Leadville district extends far to the southwest under Rock hill, which has been only slightly explored. The Revenue is under the management of R. B. and N. M. Estey. The discovery they have made will surely induce others who own ground on this hill to explore and develop.

Leadville, April 7.

JEFFERSON COUNTY.

(Special Correspondence).—Reports are current that telluride ores have been discovered in Turkey Creek canyon.

Golden, April 9.

MINERAL COUNTY.

(Special Correspondence).—Progress of the work in the Nelson tunnel is being retarded by the deluge of water encountered.

Shipments from the Creede district run about 2700 tons per week.

The Silver Fleece mine has been unwatered by a pump that handles 12,000 gallons per hour. The mine will now be further developed and is expected soon to become a shipper.

Creede, April 8.

TELLER COUNTY.

(Special Correspondence).—The Brodie cyanide mill, below Anaconda, recently started up, after a long period of inactivity, under lease and bond to the Centennial Gold Extraction Co., of which F. J. Arkins, E. C. Limbach, E. P. Welch and C. T. Arkins are officers. The equipment has been improved and the power changed from steam to electric. The mill is treating ore at the rate of about 1500 tons per month.

Anaconda, April 3.

(Special Correspondence).—The Mary McKinney, which last year shipped about 100 tons of ore per day regularly, divided between mills and smelters, is now reduced to about thirty tons per day of its highest grade to the smelters. It is claimed the low and medium grade is being held pending the controversy over treatment charges and freight rates.

The Elkton mine tonnage is now running about 1500 tons a month, which is all practically above one and one-half-ounce ore. Last year this mine shipped a considerable tonnage as low as three-quarter ounce in value. The contention is that they cannot afford to mine the low-grade ore at present treatment rates. The Elkton has sunk the main shaft to the 800 level, where a straight-lift pump of 1000 gallons per minute capacity has been installed. The ore body opened at the 800 level is the same as that worked at higher levels, but is of larger dimensions and about the same grade. At the surface a new first-motion, double-reel hoist will be installed. This will enable the work to go on more rapidly.

The Doctor mine is shipping about fifty tons of ore per day to the smelters. Recently a new hoist, boiler and six-drill compressor were put in. The hoist is capable of working to 3500 feet depth. At the lowest workings — 860 feet—a streak of ore was found that assayed twenty-three ounces gold and 123 ounces silver. This ore has a metallic luster and the silver is much of it in native state. The presence of such high values in silver causes much surprise. On the ninth level, at 600 feet depth, a body of ore was found off the main shoot which assayed 15% lead, sixteen ounces silver, 3½% silica, 12% iron, 41½% zinc and only a trace of gold. This is still more interesting and a continuance of such discoveries is likely to cause a revision of the geology of the district.

The lease on the Jack Pot has expired and the property will be operated by the owner company.

The Alamo, on Gold hill, has been recently equipped with a shaft house and electric hoist. R. H. Burrows is superintendent.

The Lincoln, near Anaconda, belonging to the Virginia M. Mining Co., is under lease to E. M. De La Vergne, who is fitting up the property with a shaft house, steam hoist and other improvements.

The American tunnel and the Columbia and Woodman lodes, sold by E. E. Miller to the Merrimac Con. Mines Co. of Denver, are being worked by lessees, who have recently opened a rich vein of ore.

The Midnight, on Bull hill, is reported to have opened a vein of ore 7 feet wide.

The Sacramento, in the same locality, is being worked by lessees, who have a good showing.

The Lillie and Vindicator are operating the Gillett mill, which takes most of the ore of the two mines named.

The E. Porter Gold King, which was under lease for a long period, will now be operated by Mr. Porter, the owner.

The Teutonic is being energetically developed by four sets of lessees.

The Dillon, in charge of J. P. Horgan, has just finished sinking to the 700-foot level. Work will now proceed in drifting and shipping. Three air drills are at work. The February shipments consisted of six cars and those for March were four cars.

The Monument is operating and shipping under lease to the Winners G. M. & L. Co., in control of Spencer and others. The property belongs to Everett, Williams, Woodward & Reed.

The Granite has done little since February 1st, but is now preparing for active work. The 300 H. P. electric motor for hoisting, installed several months ago, seems to have been unsatisfactory. Either a new electric hoist or a steam hoist will supplant it.

The Ajax has the foundation ready for its new first-motion, double-reel, flat-cable Corliss hoisting engine, with air-actuated brakes and clutches. The cylinders are 20x48 and will develop 550 H. P. Additional boiler capacity of 250 H. P. is also being provided. The present three-compartment shaft, 600 feet deep, will be sunk deeper. The new machinery, furnished by the Hendrie & Bolthoff Manufacturing & Supply Co. of Denver, is being installed under the directions of Master Mechanic Cleaver of the Ajax.

The La Bella M. W. & P. Co. at Goldfield, whose plant develops electric power and compressed air, will put in an additional 1000 H. P. engine and generator. Instead of increasing their compressor power at the main plant, and conveying air to the mines requiring it, the plan now is to put in compressors at the various mines, each to be operated by an electric motor attached to it. In other words, the company will undertake to supply mines with compressors and operate them by electric power from the central power station. However, their present fifty-drill compressor is occupied to its full capacity supplying drill power to the various mines in the district. At present the plant develops a capacity of 1200 K.W. Asa Fisher is the new manager.

The Portland laid off 200 of its force of 500 men on the 5th inst., the primary purpose of which is believed to be to restrict the production to the high-grade ores pending the dispute with the smelters, mills and railroads on the question of treatment charges and freight rates. In the meantime the occasion is considered opportune for repairing boilers and machinery and adding new features.

Inquiry at the offices of the Anaconda and Victor mines discloses the information that work on these two properties is not being aggressively pushed at present.

Shipments from the Last Dollar for March amounted to 1350 tons of mill ore and 325 tons of smelter ore.

The Pinto shipped 420 tons of ore in March, some of it high grade.

The Vindicator's March shipments amounted to 3000 tons.

Victor, April 6. WASCOTT.

(Special Correspondence).—The ore tonnage of Cripple Creek district is being considerably curtailed as the result of the discordant relations between the mine owners on the one side and the smelters, mills and railroads on the other. The controversy grew out of the advance in treatment charges and freight rates about the first of the year. The 1899 treatment charges, including freights, made by the cyanide and chlorination mills on district ores were as follows: Ores running ¾ oz. and less, $7 per ton; 1¼ to 1½ oz., $9.25 per ton; 1½ to 2 oz. and over, $10 per ton; $20 per oz. was paid for gold extracted. The 1900 treatment charges, including freight, made by the same works are as follows: Ores running up to ¾ oz. gold, $8 per ton; ¾ to 1 oz., $9; 1 to 1¼ oz., $10; 1¼ to 1½ oz., $11; 1½ to 2 oz., $12; 2 to 5 oz., $13; over 5 oz., $14. For all ore running 2 oz. and less, only $19 per oz. is allowed for gold extracted; that running above 2 oz., $19.50 per oz. It is figured that, taking into consideration the price paid for gold, the 1900 rates by the mills and roads amount to an average advance of about $3 per ton over 1899 charges.

The 1899 smelter charges were $12 per ton, including freight, on district ores running 2 oz. gold and over, with an allowance of $20 per oz. for gold extracted. The 1900 smelter rate, including freight, on district ores is $13 per ton for ores running up to 5 oz. gold and $14 per ton for ores running above 5 oz. gold, with the price of gold extracted fixed at $19.50 per oz.

The above is believed to be correctly stated, and it will be seen wherein the mines have their grievance. The miners, while they still ship their high grades, are disposed to curtail their output of low and medium grades, while contending for more favorable rates.

The smelters, during the shutdown last year, accumulated a large reserve, which they claim had not been reduced much by the first of the present year; and they claim the advance was the business consequence of being surfeited with a larger tonnage of ore than they could handle. The further contention is made that the Cripple Creek ores pack in the furnaces, retarding the work, and that the smelters are preferably in need of such lead-silver ores as come from Creede, on which they get a $10 treatment rate. It is also asserted that, as the present ore reserves are worked off, treatment charges will drop. The March tonnage, which went from the district to the smelters, was from 12,000 to 13,000, which probably is not much less than usual, though this was confined to the higher grades.

The cyanide and chlorination mills at Florence handled 10,250 tons in March; the plants at Colorado City and Gillett handled about 9300 tons and the five mills in the district about 6000 tons, making a total of about 25,550 tons, which is far below their full capacity. It is generally conceded that ores running from ¾ up to 2 oz. gold are classed as milling ore; and when the mines withhold this class of ore, it soon makes an appreciable effect on the industry of the district. As has often been shown in the columns of the MINING AND SCIENTIFIC PRESS, the cyanide and chlorination mills of this section, including those under construction, have a capacity of over 2000 tons per day, and it can not be doubted that existing difficulties will soon be adjusted so as to permit both mines and mills to profit by each other's activity. WASCOTT.

Cripple Creek, April 7.

The gross output of the Cripple Creek district for March was $2,293,128. The Gillett, Brodie, Colorado Ore Reduction Co.'s plant at Arequa and the Economic at Eclipse gulch treated 7968 tons of ore of a bullion value of $192,128. The Colorado-Philadelphia Reduction Works at Colorado City treated 9500 tons of a value of $313,500. The three mills at Florence—the Metallic, El Paso and National—treated 14,650 tons of a value of $412,500. The miscellaneous plants, such as the Detroit, Oneida and other plants, handled ores to the value of $25,000, making a total for mill-grade ores of $943,128. There was treated by the smelters 18,000 tons of ore of an average value of $75 a ton, making $1,350,000.

The Portland mine uses thirty-four air drills, two-thirds of them in development work. The mine is producing 4500 tons a month.

During March Stratton's Independence produced 3200 tons of ore, averaging $78 to the ton. The gross production amounted to $249,000, and the profit is locally reported to be 56% of that amount.

IDAHO.

LEMHI COUNTY.

At the Bingham placer at Gibbonsville water has begun to flow and active handling of gravel is resumed. The snowfall in that region, as in neighboring ones, has been distressingly light.

MONTANA.

DEER LODGE COUNTY.

The French Gulch Dredging Co. has incorporated; principal place of business Anaconda; capital stock $200,000; trustees, M. Donahoe, M. B. Greenwood, T. C. Davidson, W. R. Allen, H. R. Whitehill.

NEVADA.

LYON COUNTY.

The Dividend Co.'s ore reduction plant at Como is reported in successful operation. Some of the concentrates are said to go $500 per ton.

NEW MEXICO.

(Special Correspondence).—Great activity exists at Bland and Albemarle in the Cochiti district. It is estimated there are 1500 men employed by the various mines and mills, and that there are 3000 permanent residents. Fifty buildings have been erected at Bland within the last four months.

The Albemarle is said to be making a good profit and has a large tonnage of ore blocked out which averages $9 per ton in value, and it is claimed this is being mined and milled at a cost of $4 per ton. The mill has been enlarged and will soon have a capacity of 10,000 tons of ore per month. The Navajo tunnel, now in 400 feet, is expected to cut the main ore body within 800 to 900 feet.

Bland, April 9.

GRANT COUNTY.

The mines, machinery and mill of the Golden Giant M. Co. at Pinos Altos have been bonded to W. S. Gage of Boston, Mass., who is unwatering the property.

SANTA FE COUNTY.

Mgr. J. T. McLaughlin of the Santa Fe G. & C. Co., operating near San Pedro, says work preliminary to the erection of the copper smelter is being pressed. The new plant will have a daily smelting capacity of 200 tons copper ore.

The Magdelena M. & S. Co. has its Cerrillos smelter in operation.

OREGON.

JOSEPHINE COUNTY.

At Gold Hill the Humason 10-stamp custom quartz mill is expected to be in operation May 1.

UTAH.

JUAB COUNTY.

The Silver Park mine at Silver City is closed down temporarily and a 2-cent assessment levied.

SALT LAKE COUNTY.

The whole force of the Germania smelter at Murray are on strike. Their committee demands a 35-cent per day advance in wages, the laborers to receive $1.75 instead of $1.40, other men to receive $1.85 instead of $1.50, the furnace men to receive $2.25 in place of $1.90. The superintendent asked them to wait until he could hear from the officers of the smelter trust at Denver. On the 11th the smelter combine refused to grant the demand for increased wages. Employes went on strike.

WASHINGTON.

OKANOGAN COUNTY.

(Special Correspondence).—Eight miles east of Loomis in a depression on the southeast portion of Palmer mountain is Wannicut lake. (See illustrations on pages 397 and 401.) Surrounding this lake are fine showings of mineral, particularly on the south and west sides. It has been a custom in this district of grouping a number of locations which are known by the best showing claim in the group; among the most prominent on this part of the mountain is the Wehe group, consisting of twenty-six locations, several millsites and about 300 acres of surface ground which runs to and occupies a large part of the shore of the lake. In July, '99, this property was acquired by Messrs. Preston, Turner and Hughes of Fargo, N. D., forming a corporation, the Wehe Con. G. M. & M. Co. Associated with them are Chas. Hofer and Wm. Von Stemwehr of Cincinnati, Ohio, who financed the company, putting capital in the treasury for carrying out a plan of development which includes a 3000-foot tunnel to crosscut five cropping parallel veins, and a 500-foot shaft following the footwall of the fifth vein to connect with the tunnel. The tunnel is now in 400 feet and being continuously driven; it has already cut one vein of fair width assaying good values; the shaft is down 200 feet and the vein crossed from foot to hanging wall and found to be 14 feet in width and well mineralized across. As soon as a gasoline hoist can be installed it will be continued to 500 feet and a level run on the vein at each 100 feet sufficient to fully prove it. Gold predominates in the ore and assays run about $20, while it carries a fair amount of silver. The vein the shaft is being sunk on crops at intervals for 9000 feet, while another has croppings similar for 6000 feet, the others not being so prominent. The manager, E. C. Brown, expects that by the end of this year the work will be so far advanced that a treatment method can be decided upon. Lumber and timbers are being delivered at the mine and surface improvements begun. This and all other working properties on Palmer mountain are benefited by the deep workings in the Palmer mountain tunnel, as it forms a precedent for working plans. The Wehe property is about four miles in a tangent from that tunnel and has many of the same features. This latter property has crossed with 2850 feet of tunnel eighteen well defined veins, any one of which, with the same depth and showing, might be classed as a mine.

That this is not theoretic is proved by the Palmer mountain tunnel and others, as, for instance, the Black Bear, illustrations of which appeared in a recent number of the MINING AND SCIENTIFIC PRESS. The shaft is down 250 feet; drifts run each way to a vein, one having 2½ feet and the other 3½ feet of ore, equal in quality to anything above it, assays running

all the way from $24 upwards in gold; these veins go down nearly vertical. Perhaps the most remarkable vein yet encountered on Palmer mountain is in the Bull Frog, they having now gone through 70 feet of vein matter in the drift from the bottom of 130 feet. This ore is easily cyanided, as it contains no copper. Mill tests have shown a saving of $18.25 from ore assaying $19.50.

With three mills running the values of ores generally are holding well up to $15 and the cleanup from them this month—their capacity being with present machinery 2000 tons—is conservatively estimated at $30,000. These are the Black Bear, Golden Zone and Okanogan Free Gold, and it starts the district off at the first of the year as a producer. The three mills mentioned have machinery on the ground and en route to double their present capacity, to be soon installed.

While only actual mining operations are wanted by the MINING AND SCIENTIFIC PRESS, as is well known to your correspondent, still something a little beyond those are due to the State of Washington, which has only within the past two years entered the list of States where gold in paying quantities is mined, and especially to a section of the State in which $500,000 have been expended in the purchase and development of properties in the past year, and another $500,000 provided for the present year's work. This capital, with only one exception, has come from the moneyed centers of the United States, an evidence of the growing confidence in the mining industry, and the American public, it seems, have awakened to the great profits in the business and that it has entered the list of strictly legitimate business callings.

FOREIGN.

BRITISH COLUMBIA.

At Lillooet the Brett mines have been bought by Ashcroft men for $150,000—$10,000 down, balance in installments. It is the intention of the new owners to put in a second 10-stamp mill.

Mgr. A. O. Egbert of the Star M. Co. believes the labor question will soon be settled satisfactory to both sides. "The prices agreed upon and now in force in the Slocan gives general satisfaction. The recognition of the union as a whole cuts but little figure at the present time and is a matter that will adjust itself without any material change from the present status of things. The conditions brought about by the strike of last June are by reason of the recent agreements between mine owners and miners fast being displaced by more healthy and normal contions. The mines in the immediate vicinity of Ainsworth have not been working full force the past year, but now that the wage question is about settled, I look for a general revival."

CHINA.

S. Newhouse and associates have three concessions from the Chinese Government: the exclusive right to mine for precious metals and precious stones in the district of Jehol, northern China, 160 miles north of Pekin; the right to operate the coal mines at Shish-Meh-Chai, on the east coast of China; all the timber rights and mining rights for the precious metals, iron and coal on both sides of the Yalu river. A. Mathez, W. Irelan and E. B. Field will have charge of the preliminary work.

MEXICO.

R. O. Towne of the City of Mexico and H. W. Praetorius, Mgr. Sombrerete M. Co. of Parral, Chihuahua, will establish a custom smelter in Santa Barbara district near Parral, to which point the Mexican Central is extending its Parral branch line.

THE KLONDIKE.

(Special Correspondence).—All Dawson, and nearly all the Klondike, is off to Cape Nome. This is now almost entirely a country for capital. The '99 output was $16,000,000: 1900 promises to double that. This is largely because of improved methods in working, mainly the use of thawing by steam instead of wood. This has reduced the cost of working per square yard from $15 to about from $3 to $5. You can only reckon the square yard, because the depth of the pay varies very much, and you can't figure by the cubic yard. Of course, as freights and the cost of appliance comes down, this will be materially reduced. Though capital does not care much for gravel, London is becoming interested in the Klondike. Even now, with the Dutch war on, London men have sent in over $250,000 since New Years.

Dawson, Y. T., March 20.

The Dawson Daily News says: It has been demonstrated that ground can be worked in summer with proper machinery cheaper than in winter. The summer work has many advantages. The miner need not work one day in doubt as to what he is doing. In winter one works in the dark, literally and figuratively. The pannings here and there by which a man tries in the winter season to keep track of the pay and to test the value of his ground, is really no test at all. For instance, a man may find a $6 pan, and by that standard he has very rich dirt. But 1 foot away from the spot where he got that pan he may be able to scare up no more than a few colors. Then suppose, in trying for a test of the value of the claim, the man had not by accident struck this rich little pocket—this $6 pan? The claim would be condemned as valueless. The only way that ground can be really tested is by washing a quantity of dirt in the sluice boxes, and that can only be done properly in summer. In summer the man can carry his dirt directly out of the mine into the sluice boxes and dispose of it at once. He may clean up every day if he wishes to and knows just exactly the kind of ground he is going through. In this way he can save, too, fully one-third the expense in the double handling and double thawing of the ground. After this winter there will be very little winter work done here.

Personal.

DUNCAN MCVICHIE of Mercur, Utah, is visiting California.

PROF. JENNEY, Missouri's State Geologist, is examining Utah mines.

MGR. LAHAISE now has charge of the Draper mine, Tuolumne Co., Cal.

GEO. W. MAYNARD of New York City is inspecting copper property at Alberni, B. C.

P. GEO. GOW of the Jumper mine has returned from San Francisco to Tuolumne Co., Cal.

T. H. OXNAM, Gen. Mgr. Bully Hill mines, Sallee, Cal., has returned from San Francisco.

ED J. FOWLER, metallurgist at Campo Seco, Calaveras county, Cal., is in San Francisco.

A. P. REDINGTON of San Francisco has returned from a trip to Shasta county mining properties.

JAMES ANGUS SNEDAKER, of Denver, Colo., recently made a professional trip to southern Arizona.

F. PANTER, managing owner Evening Star mine, Whitehouse, Cal., has returned from San Francisco.

C. A. HAMILTON of San Francisco is on a business visit to the Cleveland Con. mines, Shasta county, Cal.

J. E. KEELER of the Lick, Cal., Observatory has been elected president of the Astronomical Society of the Pacific.

J. W. FRANK of Red Bluff, Cal., leaves next week to take charge of mining properties for D. M. Burns in Durango, Mexico.

W. S. ADDITON, formerly chemist for the Portland Gold Extraction Co., Sawyer's Bar, Cal., has gone to British Columbia. He is succeeded by Mr. Brant.

FORBES RICKARD of Central City, Colo., has been engaged by the Venture Corporation of London to go to the east coast Siberia to examine the beach sands opposite Cape Nome.

H. W. HIXON, late Supt. East Helena, Mont., smelter, goes next week to London to consult his principals, who have employed him to construct and operate a copper and nickel smelter in Canada.

THE election last week of H. H. Rogers Pres. and W. G. Rockefeller Treas. Butte & Boston Con. Copper M. Co., is understood in the East to confirm reports that amalgamated copper stockholders had secured large interests in the Butte & Boston, and strengthens the opinion that the latter company will eventually be merged in the Amalgamated Copper Co.

Commercial Paragraphs.

PRESIDENT JNO. SIMONDS of the Simonds Saw Co., San Francisco, has presented to the College of Mechanics of the California State University a Marsh steam pump.

THE Union Gas Engine Co. has moved to its large new building, corner First and Clementina Sts., San Francisco, and now has every desired convenience and facility for conducting its business, enabling the company to fill orders with even more than former promptness.

MCCARTHY & MACKAY, 226 Market St., San Francisco, supply asphalt paper pipe and guarantee it to stand 75 pounds pressure. They claim it to be the lightest pipe in the market, will not break, easy to lay and put together, and, being a nonconductor, water in it will not freeze at ordinary temperatures.

IN view of the rush this season to Cape Nome and Alaska, and the necessity of suitable machinery to work the beach placers, attention is directed to the Little Alaska gold washer, which has now, after some years experience, established its claim to favorable public notice. They were used in Alaska last year with success, and this year the manufacturers expect a much greater number of them will be used. Messrs. Russell & Kinsey of Los Angeles, Cal., the owners of the patents covering this washer, report a demand for it from all parts of the country, shipments having recently been made to placer mines in Eastern Siberia, Alaska, Northwest Territory, Canada, Mexico, Nicaragua and other South American countries, and also to different placer fields of the United States.

Industrial Notes.

—The Red Bluff Electric Power Co. has incorporated at Red Bluff, Cal., to furnish light and power; capital stock, $250,000; subscribed, $185,000.

—With the Colorado Midland and Colorado Southern railroads at Leadville, the latter road will lay a third rail to accommodate the cars of the former.

—On the 11th the U. S. Senate passed the Pacific Cable bill, appropriating $3,000,000 for the construction of a cable between San Francisco and Honolulu.

—One result of the Transvaal war is noticeable in the fact that U. S. uncut diamonds during February amounted to $956 as against $1,018,880 in February, '99.

—The value of the silver coins of the world has increased from $0.59091 per ounce fine on Jan. 1, 1900, to $0.60220 on March 31, making an increase of $0.01129.

—The Peyton Chemical Works have bought a site near Martinez, Cal.—350 acres of uplands and 363 acres of marsh lands—for $20,000. In addition to manufacturing chemicals and smokeless powder, dynamite will also be made.

—The following table gives a comparison of prices in the United States and England:

Article and Quantity.	U. S. price.	Eng. price.
Lead, 100 lbs.	$4 70	$3 64
Litharge, lb.	8⅜	4¾
Wire, smooth, 100 lbs.	3 05	2 50
Barb wire, galv., 100 lbs.	3 80	2 39
Wire nails, 100 lbs.	3 38	2 55
Iron ore, ton.	6 125	5 25
Tin plate, 100 lbs.	4 85	3 60
Sheet steel, 100 lbs.	2 70	2 07
Galvanized iron, 100 lbs.	3 78	3 23
Steel beams, 100 lbs.	2 30	1 80
Borax, refined, lb.	075	034
Lime, bbl.	90	62
Cream of tartar, crystals, lb.	22½	159
Bleaching powder, lb.	2¾	015
Castor oil, lb.	12¼	066
Caustic soda, 100 lbs.	2 42	1 84
Cement, Portland, best, bbl.	2 55	1 11

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING APRIL 3, 1900.

646,532.—GOLD DREDGE—S. Babare, Tacoma, Wash.

646,567.—TIRE HEATER—E. Beeson, Fresno, Cal.

646,797.—PISTON PACKING—M. E. Briggs, Alameda, Cal.

646,811.—TACK PULLER—J. H. Driller, Los Angeles, Cal.

646,522.—CAR VENTILATOR—G. A. & R. F. Dunn, Dinuba, Cal.

646,523.—SPRAYING APPARATUS—G. A. & R. F. Dunn, Dinuba, Cal.

646,640.—LIFT PUMP—G. H. Evans, Oroville, Cal.

646,822.—FEED BOX—F. Galloway, Central Point, Or.

646,538.—WELL AUGER—J. Hahn, Colegrove, Cal.

646,734.—CONDIMENT HOLDER—M. L. Hansen, Oakland, Cal.

646,432.—ADVERTISING DEVICE—Heiron & Toffelmeier, San Leandro, Cal.

646,553.—WHARF—H. C. Holmes, S. F.

646,832.—FLUSHER—S. C. Houghton, S. F.

646,737.—FISHING REEL—J. Howe, Tacoma, Wash.

646,843.—WATCH DIAL—E. Krahenbuhl, San Rafael, Cal.

646,845.—CURRYCOMB—C. F. Laflin, Asotin, Wash.

646,441.—MINER'S PICK—J. B. Lucas, Valley Springs, Cal.

646,447.—AIR BRAKE—C. E. Morgan, Portland, Or.

646,867.—IGNITER—O. Owens, S. F.

646,546.—BICYCLE BRAKE—P. W. Pratt, S. F.

646,560.—INK WELL—D. H. Rowe, Oakland, Cal.

646,505.—GOVERNOR—J. N. Rundle, Santa Barbara, Cal.

646,509.—BILL-CARRYING APPARATUS.—A. W. Thierkoff, Redding, Cal.

646,510.—SPRING CLAMP—A. W. Thierkoff, Redding, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AUXILIARY MOTORS FOR VESSELS.—R. T. Power, New Westminster, Canada, three-tenths assigned to R. D. Perry of San Francisco, Cal. No. 646,374. Dated March 27, 1900. This invention relates to an attachment for vessels, which is designed to produce an independent power to be used for any desired purpose, either upon sailing or steam propelled vessels. It consists of one or more open-ended tubes or passages, extending through the vessel below the water line, and essentially parallel with the keelson. Within these tubes turbines or other water wheels are journaled, so that the rush of water through the tubes, caused by the movement of the vessel through the water, will propel the turbines or wheels. Connection is made in any suitable or desirable manner with the shafts of these wheels, and the power thus derived may be applied either to an electric generator, and through the generator, or directly, if it is a steam-propelled vessel. The power thus derived may be transmitted to a propeller shaft to assist in propelling the vessel.

WHARF CONSTRUCTION.—H. C. Holmes, San Francisco, Cal. One-half assigned to Carl Uhlig, same place. No. 646,553. Dated April 3, 1900. This invention relates to improvements in wharves and like structures, and its object is to provide a stronger and more permanent foundation than can be had by the use of single piles as usually driven, and means to provide for protecting the wharf from the shocks caused by vessels or other floating objects striking against it. It consists of piles driven in clusters, and a wooden enclosing cylinder sunk around the piles with its lower end embedded in the mud, and a filling of concrete which surrounds the piles within the cylinder. Exterior to the line of the wharf structure which is built upon these piles are a series of fender piles at a distance from the edge of the wharf and ribs or timbers are bolted thereto in lines above and below the wharf timber and independent thereof. Springs are placed intermediate between the fender piles and the edge of the wharf, and these are of sufficient strength to resist the pressure when a vessel strikes against them, and prevent damage to the wharf itself.

INK WELL.—D. H. Rowe, Oakland, Cal. Assignor of two-thirds to W. E. Gibson and C. H. True, of same place. No. 646,560. Dated April 3, 1900. The object of this invention is to provide a well with means for fixing it in an opening or socket in the desk, a rotatable cap having a cover normally closed by gravitation, through which cover when opened the well can be replenished. The rotatable cap has an opening in the side coincident with a similar opening in the top of the well so that when these openings are brought in line a pen can be dipped in ink through the connected openings. When the well is out of use the cap is turned and a lip or flange upon the cap covers the opening and prevents the entrance of dust and the evaporation of the ink.

SPRAYING APPARATUS.—G. A. & R. F. Dunn, Dinuba, Cal. No. 646,523. Dated April 3, 1900. This invention is designed for the spraying of fruit trees, plants and for other like purposes. It consists of a main containing reservoir, a supplemental closed chamber, with connections by which liquid is delivered from the first to the second chamber, an air pumping mechanism connecting with the closed chamber and through it discharge air into the main chamber. Independent liquid and air conveying pipes are lashed together and a nozzle is provided common to both, with an automatic discharge regulating valve for either liquid or air; means are provided for agitating the liquid to keep it thoroughly mixed before being discharged.

Recently Declared Mining Dividends.

Silver King, Utah, 50 cents per share, $75,000	April 10
Monarch, Colorado, 12 cents per share, $120,000	April 6
Portland, Colorado, 2 cents per share, $60,000	April 15
Plumbago M. Co., California, $12,000	April 2
Mammoth M. Co., Utah, $40,000.	April 15
Daly-West M. Co., Utah, $37,500.	April 15
Favorite M. Co., Colorado, $48,000	April 20
Honduras Rosario M. Co., 10 cents per share, $15,000	April 16
Mercur M. Co., Utah, $25,000	April 20

Latest Market Reports.

SAN FRANCISCO, April 12, 1900.

SILVER—Per oz., Troy: London, 27⅜d (standard ounce, 925 fine); New York, bar silver, 59½c (1000 fine); San Francisco, 59½c; Mexican dollars, 48½c.

COPPER.—New York: Lake, 1 to 3 casks, 17.25 cash; carload lots, 17.00; Electrolytic, 1 to 3 casks, 17.00; carload lots, 16.87½; Casting, 1 to 3 casks, 17.00; carload lots, 16.75. San Francisco: 17½@18. Mill copper plates, 21½c; bars, 23½@25c.

LEAD.—New York, $4.72½; St. Louis, $4.60; San Francisco 5c, carload lots 5¼c, 1000 to 4000 lbs.; pipe 7½, sheet 8¾, bar 6¼c. London, Soft Spanish Lead, £16 13s 6d= 3.4c per lb.

SPELTER. — New York, $4.77; St. Louis, $4.70; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 50@55c ₱ lb.

SOLDER. — Half-and-half, 100-lb. lots, 21½c; San Francisco, Plumbers', 100-lb. lots, 18¼c.

IRON. — Pittsburg, pig, No. 2, foundry, $23, gray forge, $21.50; San Francisco, bar, per lb., 3¼c.

STEEL.—Billets, Pittsburg, $33; sheet bars, $37; San Francisco, bar, 12c to 20c per lb.

QUICKSILVER. — New York, $52.50; London, £9 12s 6d; San Francisco, local, $51.50 ₱ flask of 76½ lbs.; export, $47.50.

PLATINUM.— San Francisco, crude, $16 ₱ oz.; New York, $18; manufactured, $19.50@22.00.

FERRO-TUNGSTEN.—New York, 37c, 40c; San Francisco, 75c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, $125.

MAGNESIUM.—New York, $3.00 ₱ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 6c; slab, 6¼c; bar, 8c.

TIN.—New York, pig, $31.50; San Francisco, ton lots, 34c; 1000 lbs., 34½c; 500 lbs., 35c; less, 36c; bar tin, ₱ lb, 40c.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

NICKEL.—New York, 40@45c ₱ lb.

BISMUTH.—New York, ₱ lb., $1.70 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

TUNGSTEN.—New York, ₱ lb., $1; San Francisco, $1.15.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ₱ set; 14 oz., 40s., 11c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 33@35c ₱ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, 1¾c ₱ lb. 66% B; soda ash, $1.60 ₱ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ₱ lb.; blue vitriol, 5⅛@6c ₱ lb.; borax, concentrated, 7@8c ₱ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@ 2½c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ₱ lb.; caustic soda, in drums, 3@4c ₱ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ₱ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $6.50; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50.

San Francisco Stock Board Sales.

SAN FRANCISCO, April 12, 1900.

9:30 A. M. SESSION.

300	B. & B.....29c	300	Overman....26c
100	Caledonia..$1 20	150	Potosi.....15c
100	Challar.....15c	100	Sierra Nev..53c
200	Crown P't...21c	300	Silver Hill...20c
600	Ophir.....80c	100	Y Jacket....33c
200	.....81c		

2:30 P. M. SESSION.

300	Ophir.....80c	50	Potosi.....16c
300	G. & C.....28c	100	Y. Jacket...34c
300	Savage.....12c	500	Andes.....11c
300	.....11c	300	.....12c
400	Challar.....14c		

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: **EDWARD N. BREITUNG,**
MARQUETTE, MICH.

Quicksilver

—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET, SAN FRANCISCO.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

SPIRAL SAND PUMPS.
THE FRENIER & LEBLANC SAND PUMP is the cheapest and most durable pump on the market for pumping sand, crushed ore, slimes and tailings. For prices and further information, apply to
M. S. HAUSER,
3 California Street, San Francisco, Cal.

FOR SALE--$6000.
A GOLD MINE.
Ledge averages 3 feet. True fissure in granite. Values $1.50 to $16 per ton. Equipped with 5-stamp mill. Water power, good buildings, fine timber. Easy of access. Splendid opportunity for three or four miners who will do their own mining and milling. Satisfactory reasons given for selling, and rigid investigation desired. Address E. H. B., care of Mining and Scientific Press.

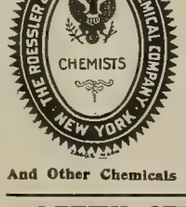
FOR SALE—NEW BRUCKNER ROASTER.
size 27 ft. by 8 ft. 6 in. Knock down for immediate delivery. Feed hoppers. Address "Roaster," care Mining and Scientific Press, San Francisco.

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STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
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REFRACTORY GOLD ORES.
Owners of properties showing sufficient developments to prove existence of ore bodies, but unable to recover values on paying basis, please communicate with Box 26, 320 Sansome St., San Francisco, Cal.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from the Red Dog Mining Company and South Yuba Water Company, in the Red Dog Mine, near You Bet Station, Nevada Co., to deposit tailings in Greenhorn Creek; from Martin Klein, in the Bowlder Hill Mine, near Placerville, El Dorado Co., to deposit tailings in a ravine below the mine; from G. E. Volmer, in the Little Kloadyke Placer Mine, near Placerville, El Dorado Co., to deposit tailings in Coon Hollow Creek; and from E. W. Hayden, in the Bluff Placer Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in a ravine below the mine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on April 30, 1900, at 1:30 P. M.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.



CYANIDE
Peroxide of Sodium
Hyposulphite of Soda
Chloride of Lime
Sulphide of Iron
And Other Chemicals for Mining Purposes.

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SITUATIONS WANTED.

FIRST CLASS QUARTZ MILL MAN
expert on rebellious ore, wishes position as amalgamator, or will take charge of quartz mill. Best of reference furnished. Address J. M., this office.

Experienced Assayer and Mill Man
desires engagement. Has been assayer in gold mines and smelters and has had charge of stamp mills. Address M. A., this office.

POSITION BY A COMPETENT ASSAYER AND MINING ENGINEER. Understands cyaniding, milling, roasting of ores, etc. Has had experience. Best of reference. Address F. W., this office.

ACCOUNTANT AND SECRETARY open for engagement after regular office hours. Work for incorporated companies a specialty; organization meetings, accounts opened or adjusted, etc. First-class references. Address L., care of this office.

COPPER MINE IN MEXICO.
I have a large copper property, situated about seven miles from the great plant of the Moctezuma Copper Co. of Nacosari, described in the March 31st issue of this paper. The surface indications and the geological formation of the two properties are very similar, and my developments so far made encourage the belief that the mineral deposit is of equal extent and value. Owing to the improved conditions resulting from the advent of the railroad and the erection of the big smelter so near, making a market for the ore, this property can be made self-developing to any extent by the expenditure of a comparatively small sum. Any interested party can make a good deal of some kind by communicating with
GEO. A. HASKELL,
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Los Angeles Co., Cal.

EFFECTING ECONOMY IN
Steam and Power Plants
IS MY BUSINESS.
DOES IT INTEREST YOU?
Howard H. Fielding,
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COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

WANTED.

A competent and experienced Hydraulic Engineer capable of taking full charge of an extensive piece of work. Answer: Wrenn, California Hotel, S. F.

GASOLINE HOIST WANTED.
Second hand but in perfect condition. 10 H. P. W. B. MURDOCH, 405 Montgomery St., San Francisco, Cal.

WANTED—A BALL, DODGE,
or other practical pulverizer for dry rock crushing, in good serviceable condition. Address "Pulverizer," this office.

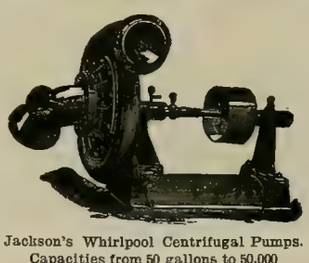
WANTED—MINE FOREMAN.
Good position for steady, sober and experienced miner. State age, experience and salary. AMALGAMATOR ALSO WANTED. Gold Hill Quartz Mining Co., Gold Hill, Oregon.

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GOLD SAVING MACHINERY.
THE BARLING
Beach Gold Concentrator.
Hand or power. A single process Machine which saves the free gold by gravity. Efficient, light, inexpensive. 14 SPEAR ST., SAN FRANCISCO, CAL.

MARSHALL GOLD SAVING MACHINE
An amalgamator and black sand separator based on scientific mining principles and practical experience. At Oriental Gas Engine Co.'s Works, 229 Folsom St., San Francisco. Have been used successfully for past two years.

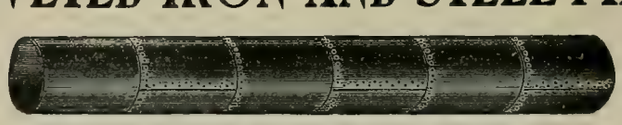
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Very compact when knocked down for shipment.
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Boilers, Engines, Hoists,
FOR IMMEDIATE SHIPMENT.
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PUMPING MACHINERY.
BUILT LIGHT AND STRONG.
COMPLETE PLANT IN OPERATION AT OUR WORKS.
Centrifugal Pump and Steam or Oil Engine Direct Connected.
Sand Pumps, Rock and Gravel Pumps, Mining Machinery, etc.
Jackson's Whirlpool Centrifugal Pumps. Capacities from 50 gallons to 50,000 gallons per minute.
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FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by **MODERN MACHINERY.**
AGENTS FOR THE Celebrated **CANTON STEEL.**
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STEEL RAILS, TRACK FIXTURES,
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BAR, SHEET AND BOILER STEEL,
STRUCTURAL MATERIAL,
Cold Rolled Shafting.

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For Testing Placer Ground.
Sinks and drives 6, 8 or 10-inch pipe through boulders; takes all the loose material out, including gold, as the hole is sunk. Does the work at a very small cost. Drills water and oil wells and mineral test wells through any kind of rock to 1500 feet. Several sizes. Unexcelled for lead and zinc testing.
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A WATER-JACKETED PYRITIC SMELTER, Fifty Tons Daily Capacity, Second Hand, in Use Two and a Half Months, FOR SALE CHEAP.
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FOR SALE CHEAP.

Two 6-ft. and six 4-ft. Concentrator Belts for FRUE MACHINES, also four Triumph Belts. Geo. E. Woodbury, 141-143 First St., S. F.

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A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.

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Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

Quicksilver Mine.

FOR SALE, interest in developed quicksilver mine. Furnace completed. Cheapest property on the coast to work. Capital required for additional machinery. Address "Investment," care of Mining and Scientific Press. PRINCIPALS ONLY.

A BARGAIN.

3500 feet of 16-inch, 5 B. W. G National Tube Works seamless pipe. Kimberly joints. Immediate delivery.
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DEVELOPMENT INTEREST
IN A PARTIALLY DEVELOPED MINE.

Good locality and splendid showing. Mill and equipments on property. Address S., 1122-13th Ave., East Oakland.

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A Group of Thirteen Placer Claims in Alaska on Creek Flowing Into Yukon.

Each claim has been prospected and shows good pay. Can be worked by hydraulic plant. $1000 in nuggets taken from a single claim the past winter—largest $55. Address W. L. READ, 601 New York Bldg., Seattle, Wash.

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One geared Shay Locomotive, 20 tons. Two 30-in. gauge Locomotives, 13,000 lbs. each 1000 tons 40-lb. T Rails; 40 tons 25-lb. T Rails; 15 tons 8-lb., 12-lb., 16-lb. T Rails. Correspondence solicited.

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Relaying Rails

For Mines and Street Railways.

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WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

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MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.
ELECTRICAL DEPARTMENT: Theory and Practice; Construction,
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Are the CHEAPEST because
They Are the Most Durable.

Beware of Imitations.

GOLD SEAL, BADGER AND PIONEER Belting, Packing and Hose.

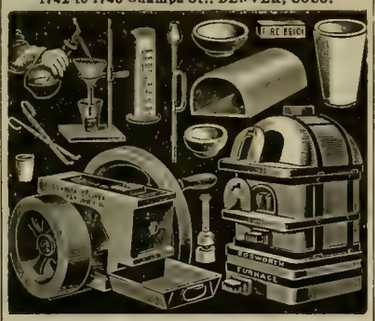
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Valves, Gaskets Etc., Made to Order.

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Nos. 73, 75 FIRST ST., Portland, Or.

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Manufacturers, Importers and Dealers in
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WRITE FOR CATALOGUES.



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EVEN ILLUMINATION.
SUSTAINED CANDLE POWER.
SEND FOR PRICE LIST.

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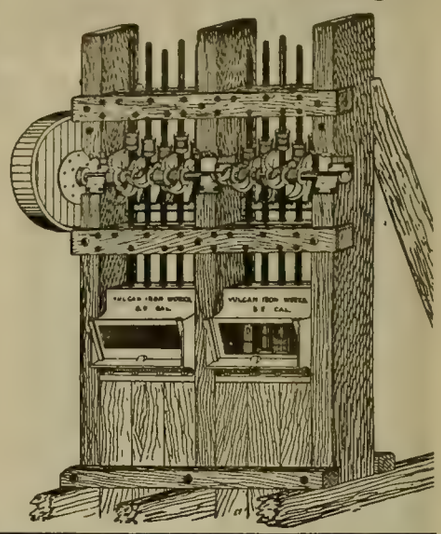
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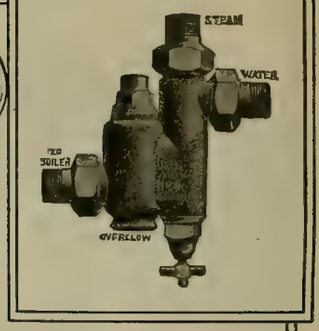
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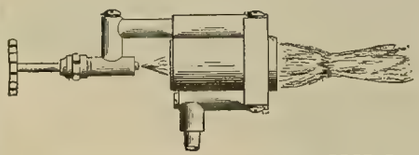
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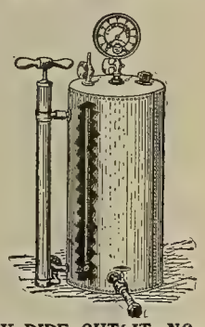
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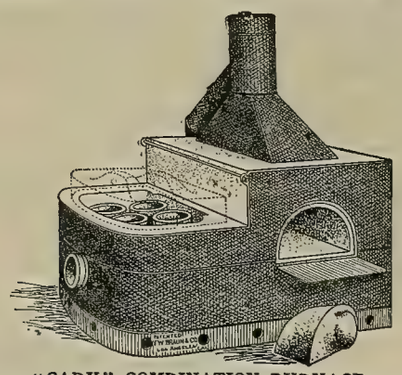
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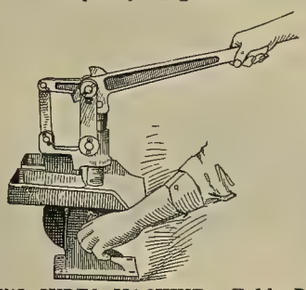
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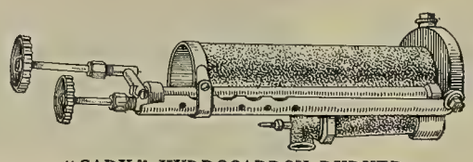
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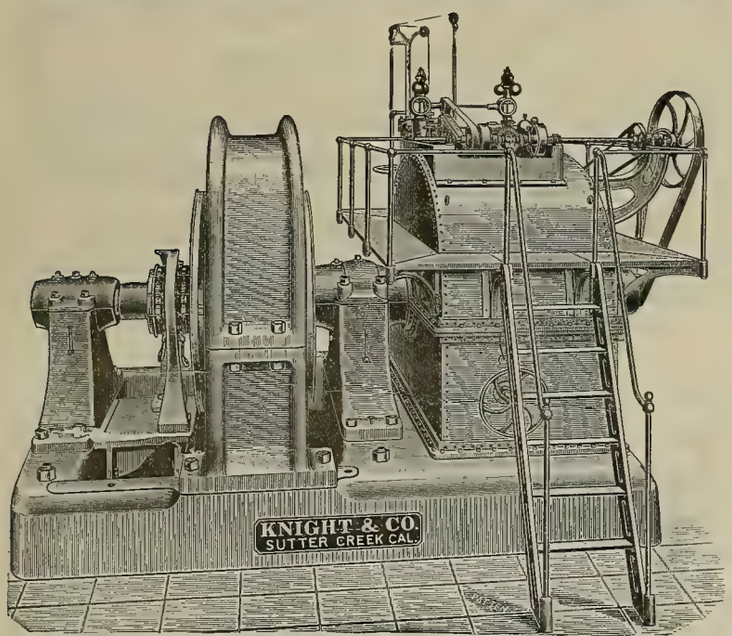


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WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.
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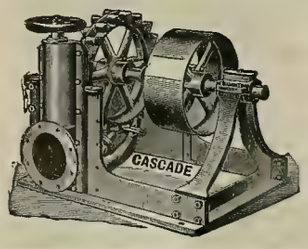
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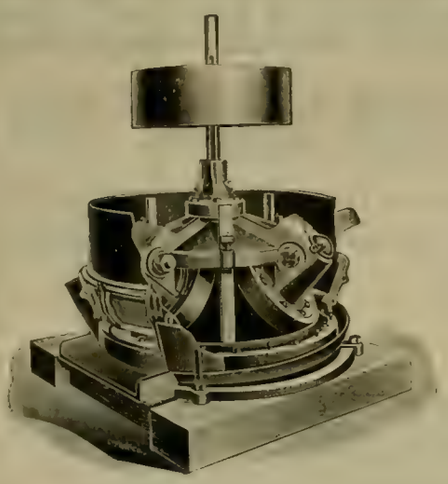
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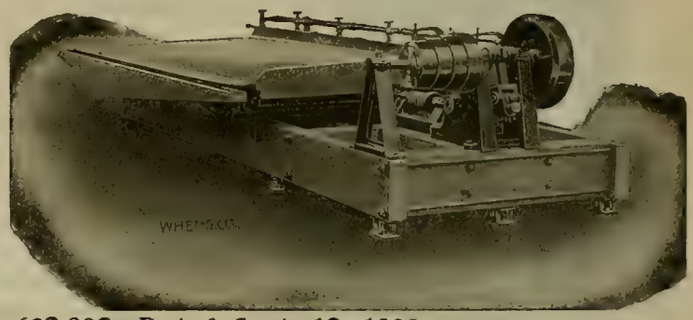
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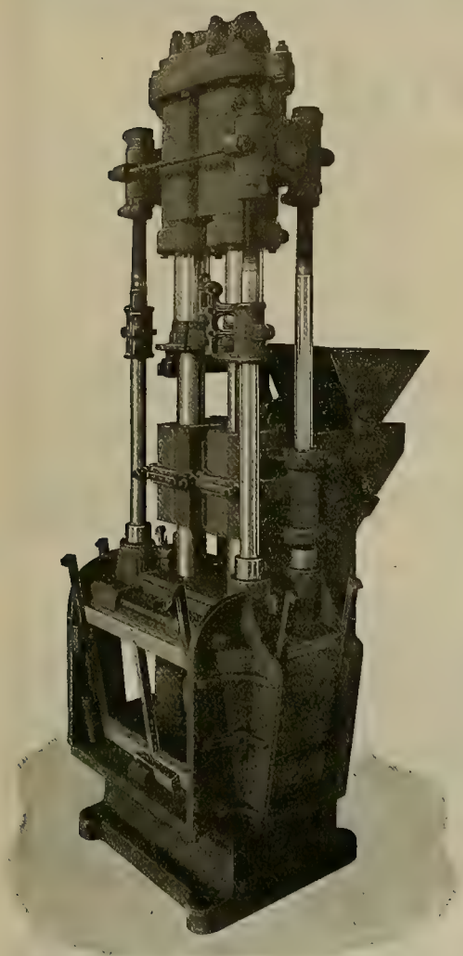
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MY DEAR SIRS:—

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Enclosed I hand you a statement amounting to $20,210.72, which is the total product of the Mill for the twelve months, giving dates that we sent the bars to the mint at San Francisco and the amount we received for each bar.

I think the Tremain Mill is the best friend that a prospector or an individual who has practically a good mine can get hold of, to furnish him money to develop his property. I bought the Storm Cloud Gold Mines the last of June in 1897. In the fall of that year I bought, as you know, one of your Tremain Mills. From the day I started it it has paid all my developing expenses, and from the report made by the geologist of Arizona, December last, I now have $940,000 of ore blocked out, the expense of which has been paid from the net proceeds of the Tremain Mill. I have paid for over 1800 feet of development work with this Mill since I erected it two years ago last October. My experience teaches me that if anyone has any trouble with the Tremain Mill it is the fault of the man who operates it.

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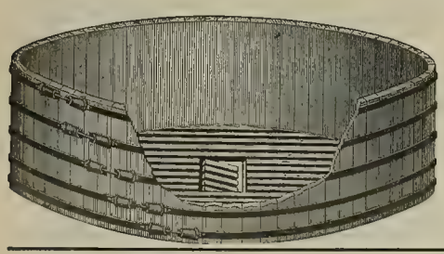
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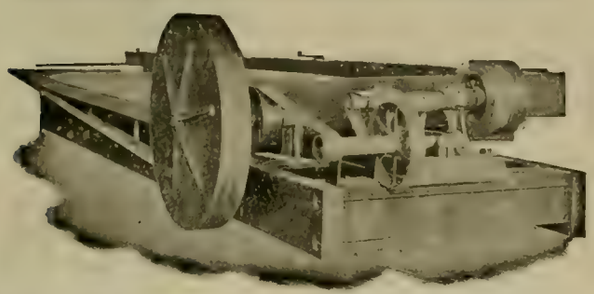
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MINERS, ATTENTION!



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THE above illustration of Scheper's Hammer Sling tells the whole story. It is seen at a glance that the weight of the hammer is carried on the wrist and forearm, by the sling, thus avoiding the firm and tiresome grasp necessary to hold the hammer in the ordinary method.

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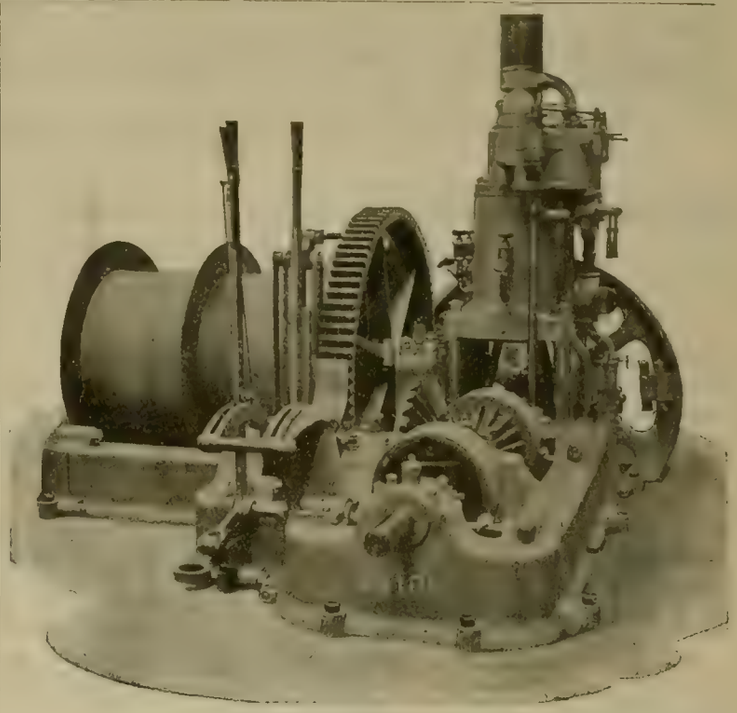
To attach the sling to the hammer it is only necessary to drill a three-sixteenths of an inch hole through the hammer handle, about one-half inch from the hammer, as shown in the cut.

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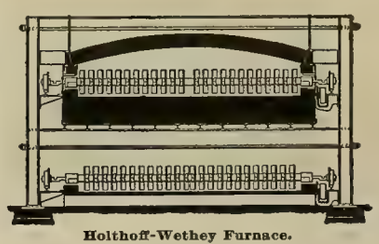
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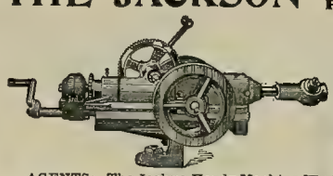
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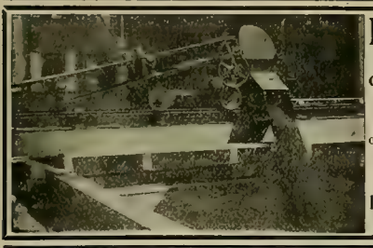
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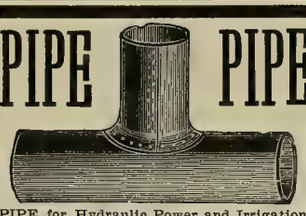
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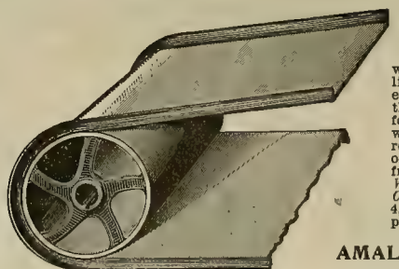
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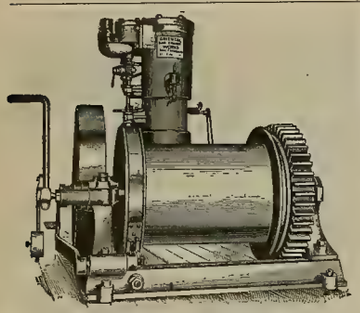
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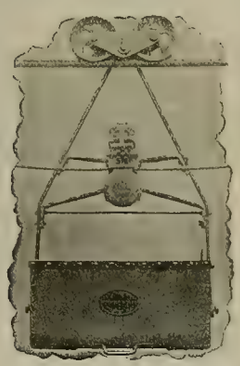
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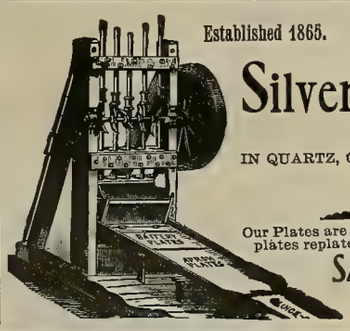
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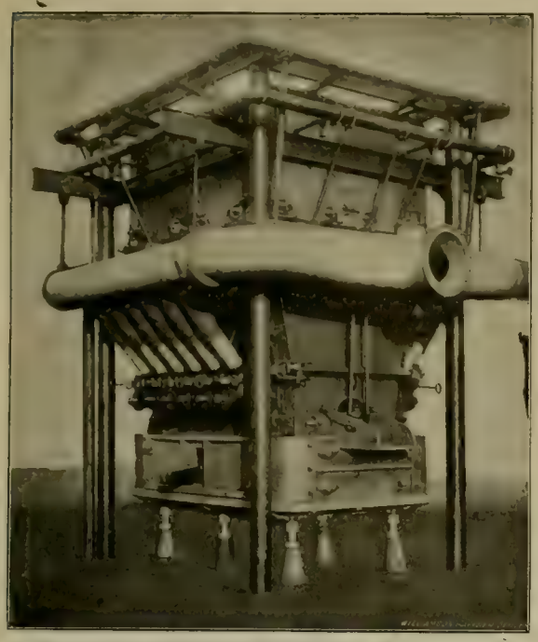
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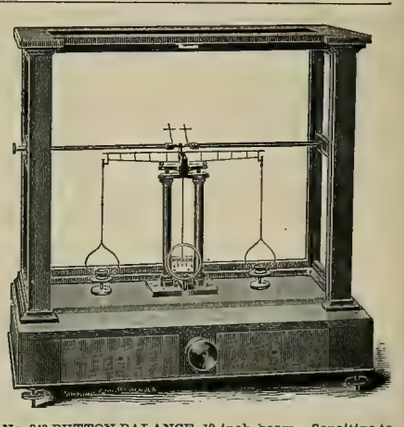
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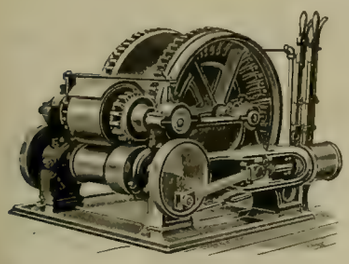
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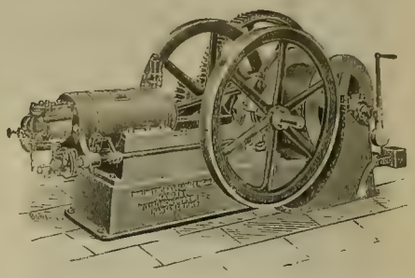
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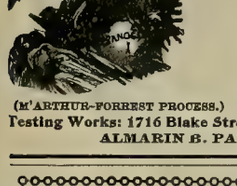
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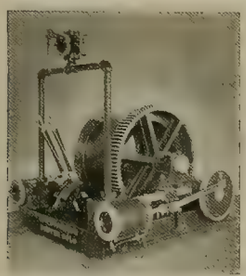
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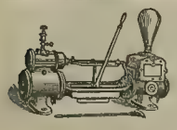
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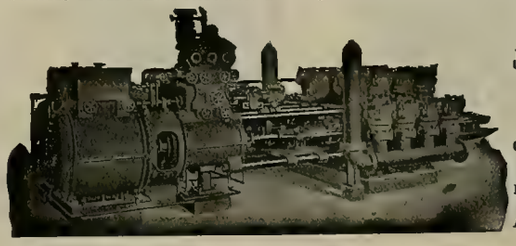


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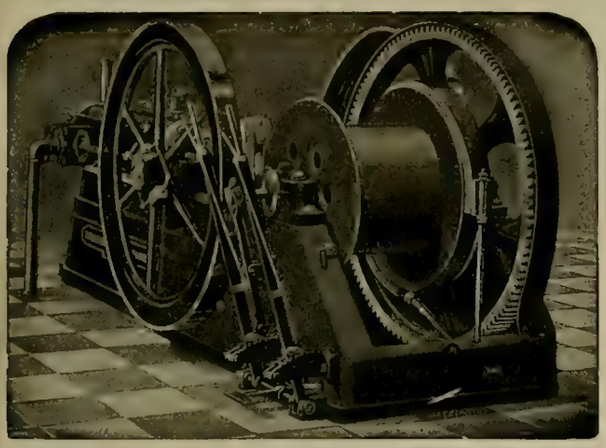
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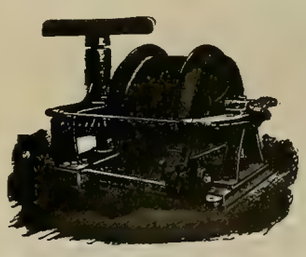
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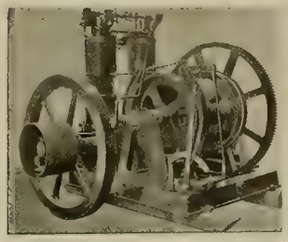


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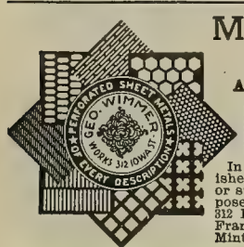
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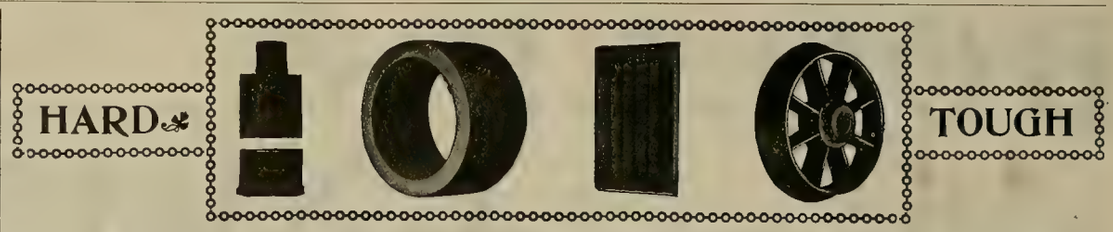
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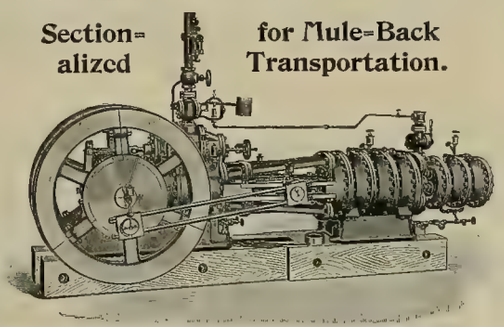
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Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of April, 1900, an assessment (No. 23) of 2 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of May, 1900, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 28th day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of April, 1900, an assessment (No. 70) of fifteen (15c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 31st day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of April, 1900, an assessment (No. 16) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of June, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

OSCEOLA CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1900, an assessment (No. 9) of one (1c) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of April, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

Office—307 Montgomery street, San Francisco, Cal.

SOUTH PALOMA GOLD MINING COMPANY, Limited.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 17th day of March, 1900, an assessment (No. 2) of six-tenths (6-10) of a cent per share was levied upon the capital stock of the corporation, payable immediately to the secretary, John F. Barnett, at Room 22, No. 222 Sansome St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23rd day of April, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on MONDAY, the 14th day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN F. BARNETT, Secretary.

Office—Room 22, No. 222 Sansome St., San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1900, an assessment (No. 11) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of May, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 26th day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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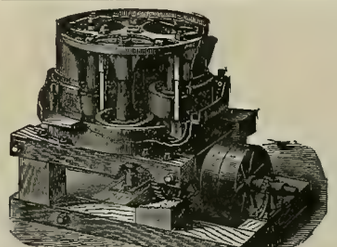
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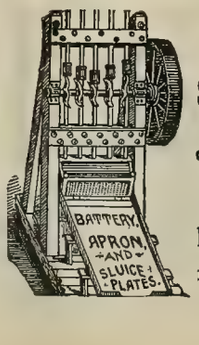
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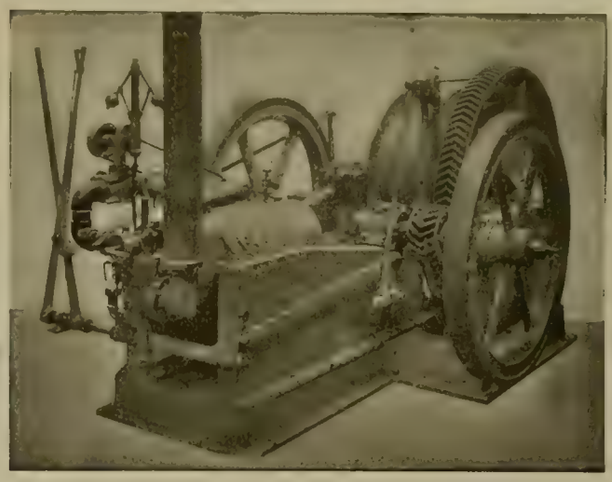
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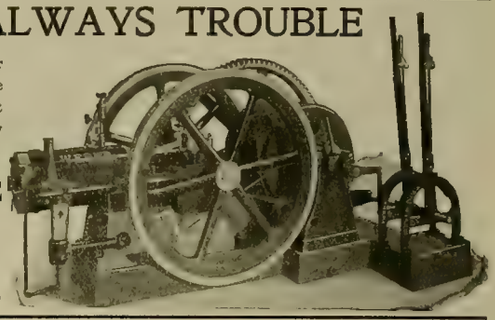


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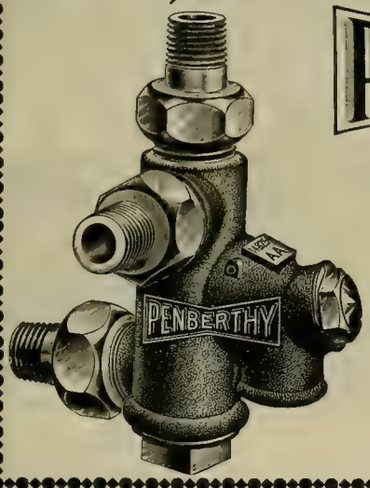
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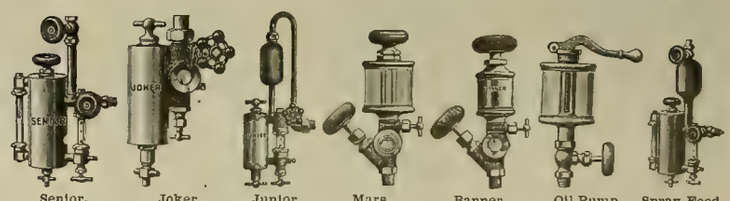
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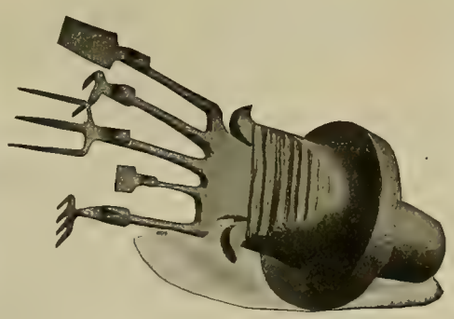
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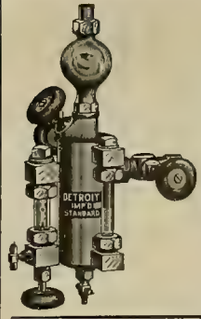
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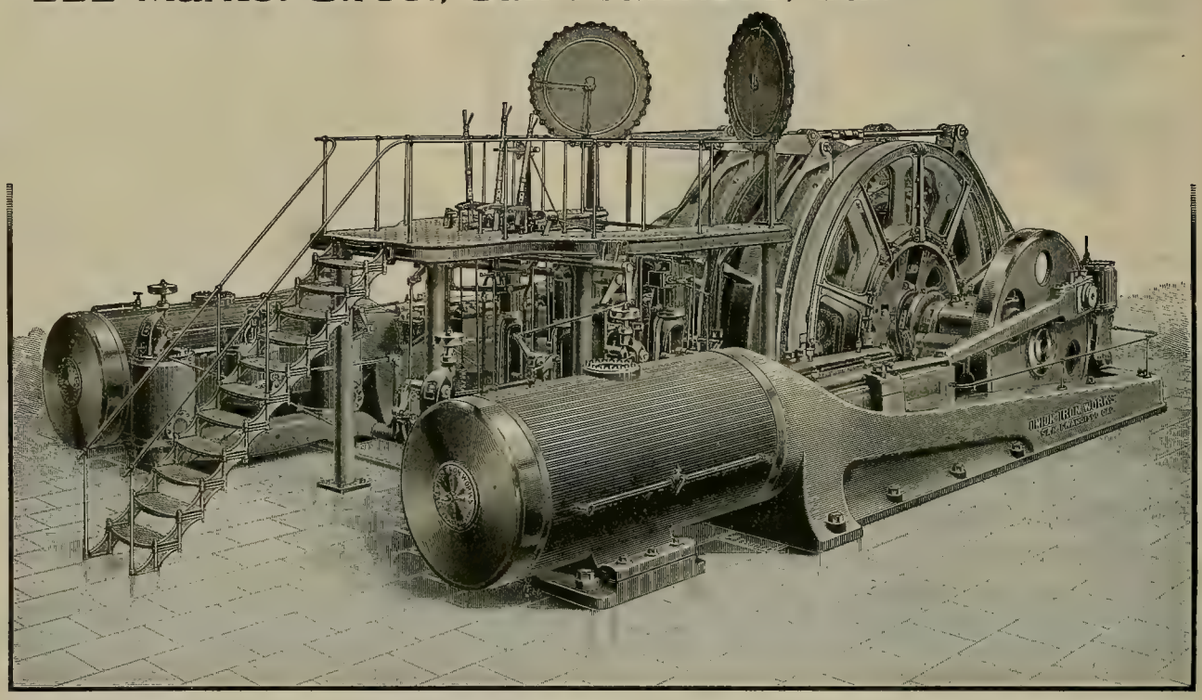
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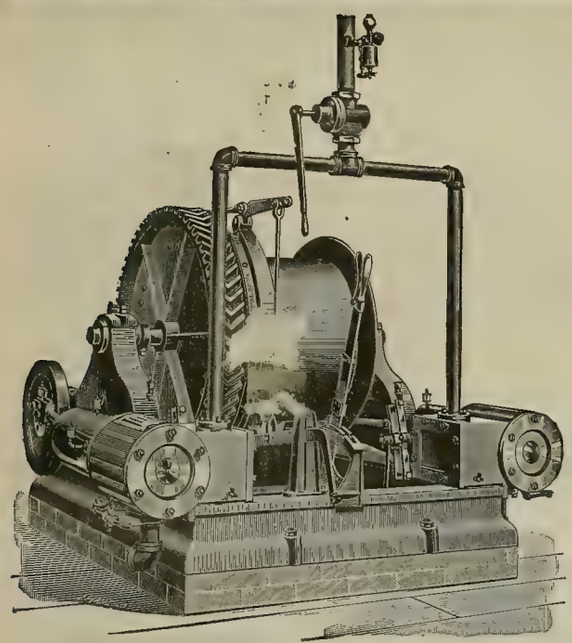


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No. 2074.—VOLUME LXXX. Number 16. SAN FRANCISCO, SATURDAY, APRIL 21, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Past and Present in Montana.

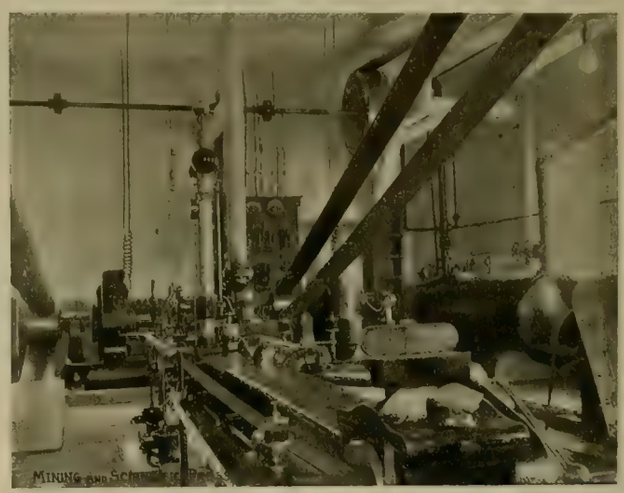
In the postoffice at Clancy, Mont., is a plain door made in 1865 for T. M. Hill, the then and present owner of the building. He has the original bill. Here are the items: Forty feet of lumber at 25 cents, $10; eight panes of glass 10x12 at $1.50, $12; two butts (and screws), $2.50; one knob lock, $7; putty, $1; paint, $1. Total, $33.50.

To-day such a door would cost in Clancy about $3.50. When that door was made Montana miners were paying $125 in gold for a 100-pound sack of flour; $1 per pound for potatoes and everything else in proportion; mining machinery, even such as was made in that crude day, was almost prohibitory in its price. Pioneer prospectors blazoned with their bones the weary way where now dash by the palace cars. Montana copper that makes possible the electrical advance of the Orient is now mined and refined by processes undreamed of when the door in Clancy was made for what ten doors could now be furnished. This brief note from the plain records of one generation ago is but illustrative of precisely the same conditions as contrast between past and present in any of the great commonwealths of this west half of America. Two things are to be noted. It was mining that made possible such advance as is here strikingly noted; for to scientific mining is due nearly all of wealth and prosperity in this west half of America; and gold is worth no more, no less, to-day than thirty-five years ago when its purchasing power was less than one-tenth in some cases what it is to-day. It was not the gold then nor now; it was and is the genius and intelligence, the daring progress of the American miner that created the contrast afforded between the past and present. Progress and prosperity are the created result that made possible the settlement and development of this entire west half of America. By mining men of ability made their fortunes; and when, through speculation, through unwise or unlucky investment in cattle, or politics, or real estate, they lost their money, it was the mines that put them on their feet again financially, in Montana, California or elsewhere.



De Lamar Mines. *April Fool Mines.*

De Lamar, Nevada. (See Page 434.)



Section of Engine Room, De Lamar Mill, De Lamar, Nevada. (See Page 434.)



View of De Lamar Mill, De Lamar, Nevada. See Page 434.)





Drills in Use at the Gold Bank Mine, Forbestown, Cal. (See Page 428.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

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J. F. HALLORAN.....Publisher.

San Francisco, April 21, 1900.

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IT is with reluctance that a reputable paper ever essays to answer inquiries concerning law matters, naturally propounded by persons vitally interested. Obviously these answers cannot be made with complete understanding of the case, the details and minute attendant circumstances, on which depend accurate acquaintance with the fact, not being usually supplied. As, manifestly, full understanding of such things is needed for intelligent advice it follows that in the absence of such knowledge of the facts any assistance in the matter of explaining individual rights under the law must be necessarily incomplete. Hence this paper's usual advice to consult a competent lawyer, purely as a matter of economy, for, while his fee may seem large, yet, if important interests are involved, it were better to enter or decline to enter into a legal contest fully posted than to take too many chances of loss. What is here said does not apply to ordinary questions of fact concerning the general status of individuals under the law as to ordinary mining requirements.

"MINES are made," was a recent assertion herein, the truth of which is recognized by many who realize that it is easy to locate a claim or find a prospect, but a different and difficult matter to make a mine, and yet that a mine must usually be "made." A good instance of how a mine is thus made is afforded in a recent issue of the Leadville, Colo., Miner, in a notice of the President mine, there, which may be said to be "made," in the sense meant, its maker being the present superintendent, T. Collins. This mine has a daily output of forty tons gold-bearing iron carbonates, carrying from $15 to $25 per ton. The lower grade carries considerable iron, but deducting all charges the ore nets $8 per ton—about $300 per day—nothing big, but a paying proposition. The history of the mine shows a series of expensive efforts by different parties to develop it, culminating in apparent failure six months ago, when Superintendent Collins, who all along had faith in the property, secured a little more money from two local capitalists who shared his faith to the extent of a few thousand dollars, which, judiciously expended, placed the mine on what now appears to be rightly considered as a permanent paying basis. The instance is worthy of mention, for two things: the fact that one man continued, through adverse circumstances and financial stress, to have faith in the property, and in his judgment, staid with it through all, and that, when most needed, two miners with spare money advanced enough to justify his judgment and make a success. Thus a mine was made, instancing the history of a thousand other similar cases.

A Word About "Mining News," Etc.

For forty years this paper has published in each issue two or three pages of reliable mining summary from different mining regions in this west half of America. Some of it is clipped and condensed from local papers, more is furnished by resident correspondents, more still by our traveling representatives; the whole of it is always reliable, impartial, accurate, and as exact as any information of that nature can be. When population was sparse and mines were few; when the prospector had an eye out for Indians and this whole western country didn't have one-tenth the development it now has, this paper was in many cases the only medium of mining news, and the man up the gulch or on the other side of the mountain or down the creek knew little of what was going on ten miles from him till he saw it herein. Now, with nearly every camp connected by rail, telegraph and telephone, the news is more quickly spread, and in this regard the "news" feature of the department referred to is secondary to what it was a generation ago. That is, locally: to the man in Teller Co., Colorado; Calaveras Co., California; Baker Co., Oregon; Silver Bow Co., Montana; or Yavapai Co., Arizona, it is not necessary to wait for the weekly visit of the MINING AND SCIENTIFIC PRESS to see what is done in his own county. He is well served in that regard by communication with his friends and neighbors, and by the efficient local press.

But it is even more important than ever that others should know of what is going on, and in these days of development and investment it is of prime import that the merits and resources of a mining district be shown in the columns of a journal that counts its readers all over the mining world by the thousands, and that is seen everywhere by any one interested in mining.

This is still the province and purpose of the mining news in this paper—not, as in the old days, solely to tell the miner what is going on in his own little surroundings, but to give him reliable, up-to-date condensation of what is done elsewhere; an epitome of all worth knowing in the sales, developments and movements, not alone in his county or State, but elsewhere, and to direct attention to deserving properties.

Such publicity is of recognized value: the knowledge of successful mineral development stimulates interest in a locality, induces investment and improvement to the benefit of all, and in this lies the chief value of the mining news weekly published herein.

That this is generally understood is manifest from the amount of material furnished and the eagerness displayed to secure its insertion; that it is not rightly regarded in some few instances is manifested by the mistaken assumption that this paper is a rival in the matter of competition with local journals. As a matter of fact, the more that appears about a mining locality in this journal the better for the paper or papers printed therein; for such publicity attracts the attention of the investor and brings money and improvement into the district. Time and again a brief paragraph in this paper has been the cause of attracting the attention of investors and the ultimate advancement of the district. Of course, if a community chooses to be churlish or its press decries publicity, preferring insular isolation, such privacy is to be respected; but, ordinarily, a mining community likes to have the world know what they have in the way of mineral wealth.

Then, too, the miner is a good deal of a cosmopolitan, and a great traveler. He rarely remains at home and in twenty years has ofttimes lived in a dozen different places; he can not always afford to subscribe for several papers published in the different localities in which he may be interested, nor has he the time to read them. But he does know that in the MINING AND SCIENTIFIC PRESS he will weekly get a condensation, and accurate reflex of existing conditions in any metal mining region.

What is here said is the result of reading letters from subscribers. It is the pleasure and the privilege of this paper to daily receive criticisms from its readers, some complimentary, others advisory, still others suggestive of what the writers think should or should not be done. And there is no more valuable or appreciated part of these letters that such multitude of friendly suggestion. Some say: "I like your paper and would like it better if you didn't put so damn much technical matter in it." Others suggest that as a technical paper it is just what they want, but express surprise that there is so much space given up to "mere mining news." Many say they read "Concentrates" first of all, and others think that there should be more editorial and less description, but all agree that they "like the paper," and most of our kindly critics commend the mining summary. As one distant reader this week says: "It's always meant to be honest, even if it isn't always exactly correct."

It may surprise a good many thousand readers to have us say that that part of the paper devoted to "Mining Summary" costs us more in every way than any other part of the paper. The character of a paper is sometimes best evinced by the kind of matter that it does not publish.

But while the news feature has not been lost sight of, being greatly improved, the most important element of that department of the paper is not always appreciated. That is its value as a developer. Ordinary "write-ups" at so much or so little a line are not allowed therein. Fulsome puffs of a mine that any intelligent man can see are paid for find no place in these columns. It is generally recognized and understood that if any statement is made in our columns about a mining property it is believed in this office that the information is correct. Hence the confidence universally reposed in the statements of this paper. Herein lies the chief value of the mining news to the mineral interests of this west half of America—not in conveying local information to the local man, but to others, with probability of mutual benefit to far-off readers and local property alike.

The MINING AND SCIENTIFIC PRESS does not assume that it can tell anything about a mine in Amador Co., Cal., that would be news to the superintendent of that mine: what is set down regarding a property in Tooele Co., Utah, is known and understood better by a man in Mercur than by one living in Boston or London: to attempt to tell the foreman or owner of a property in Summit or San Miguel county, Colorado, any news about the property he is developing would be useless, for he knows more about the mine in five minutes than any paper could tell in five weeks; but the question is not how much he knows about his property—that is, of course, important—but from a development or investment point of view it is vastly more important that others outside should know of it. That is where the greatest value to a mining section lies in the publication of mining news concerning it in this paper; not in telling one big man or one small community what the man or community know better than any paper can tell them, but in giving accurate information to the great outside mining world; to men with capital who don't care three straws whether the big man's name is Smith or Jones, or the little community is called Smithville or Jonestown, but who may possibly be interested in a correct statement in a reliable paper regarding possible profitable investment.

UNWORTHY of serious attention are the current advertisements of "liquid air companies," and the absurd claims made regarding reduction of cost of generating power, refrigeration, etc., thereby are too transparent to fool any one except the grossly credulous. Liquid air has not yet reached that stage where its commercial value is generally applicable in an economic way, and any one taking stock in some of the companies advertised can choose between that form of investment and buying bogus lottery tickets.

TELEPHONE LINES throughout California and eastward are now in such state of progress that it is reasonably expected that by this time next year one can speak into a receiver at San Francisco and be heard in New York City. To European readers who do not always grasp the magnitude of distances on this continent, it may be said that from San Francisco to New York is about the same distance as from London to Astrachan.

IN mining matters the force of understatement is as strong as exaggeration is weak. To say the ledge is 5 feet wide and the ore averages $7.50 when, as a matter of fact, it is 6 feet wide and averages $9, appeals more favorably to the prospective bonder or buyer than to assert that the ledge is 12 feet wide and that the ore clear across averages $18—and fail to prove it.

Concentrates.

BOOKS on mining and metallurgy are free of import duty.

MACDONALD'S "Skeleton Mining Report" is out of print, and can no longer be furnished.

ON Jan. 31st, 1900, the State of Washington had 683 stamps, of which 550 were in operation.

A PLACER LOCATION can be any shape, but an individual location can not exceed twenty acres in area.

A WOMAN, married or single, can locate and hold a mining claim by due observance of legal requirements.

"TEMPERATURE OF BATTERY WATER" was fully discussed in a practical article in the issue of Nov. 19, '98.

MACHINERY on a mining claim is part of the freehold, and, as such, title therein passes to the legal relocator of the claim.

THE buoyancy of a vacuum is about 537 grains per cubic foot. It varies with the temperature and barometric pressure.

AT sea level the atmospheric pressure on 10 square feet of the earth's surface is 10,584 tons; on ten square miles, 295,064,947 tons.

FULL detailed technical account of how to start a lead blast furnace, written by a past grand master in the art, appeared in the issue of May 21, 1898.

ALL waters act on copper. "Hard" water takes up little lead from lead pipes; "soft" water and carbonated water dissolves out considerable quantities.

MOLYBDENITE is of value in the East in the manufacture of steel. The pure concentrated mineral has a present market value in Pittsburg of $200 per ton.

A YARD of pipe will hold about as many pounds of water as the square of its diameter in inches: thus a 4-inch pipe would hold about sixteen pounds of water in each 3 feet of its length.

THE measure of actual damages for false representations in the sale of goods, which the buyer has received and paid for, is the difference between the price paid and the value of the goods.

THE specific gravity of pure iron is 7.844. Pure iron is rarely seen and is a chemical curiosity; it is white with a brilliant luster. Ordinary merchantable iron has a specific gravity of about 7.8.

WHERE the mean pressure on the piston of a steam engine is equal to eight tons, and the velocity of the piston is equal to 250 feet per minute, the theoretical horse power of that engine is 121.21.

AS IN California, gold is found in slate in North Carolina. The same general origin is ascribed to the gold formation in both cases—the ascension of mineral-bearing waters from solfataric depths.

LOCAL Michigan papers say that the Calumet & Hecla Co. is losing about $\frac{1}{10}$ of 1% of copper in the tailings, or $1,200,000 per annum. Osceola's loss is thus given at about $\frac{8}{100}$ of 1%, Quincy's $\frac{8}{10}$ of 1%.

THE latent heat of fusion of gold is 16.3 calories. In the case of most metals the latent heat of fusion is about one-third the heat required to raise the metal from absolute zero—273° C.—to its melting point.

TIN PLATE is a sheet of iron or steel coated with tin. Terne plate is a sheet of iron or steel coated with an alloy of tin and lead, in proportion of about 20 to 80, respectively. Terne plates are usually for roofing.

A COMMON CARRIER who used due and reasonable diligence in delivering a shipment is not liable to the consignee for the expenses incurred by him in going to the station to receive the same before its actual arrival.

HYDRAULIC MINERS have a theory, more or less borne out by experience, that when a gold-bearing stream forks into two or more branches the source of the gold is more often found in the right hand branch.

THE 5-cent coin in use contains 25% nickel, 75% copper. Nickel, more than any other metal, has the property of giving color to an alloy. Even an alloy of 90% copper and 10% nickel will have the peculiar nickel tint.

TONGSHAN, CHINA, is eighty miles from Tientsin. The Chinese Government has there established a factory of railway rolling stock. From the mines in the vicinity the Chinese engineering and mining company daily mine 2000 tons coal.

MOTOR manufacturers figure that a stream from which, by dam and piping, one can get forty to fifty gallons of water a minute at 10 to 20 feet of head and fall, can energize a motor that will give power equivalent to the power of two men.

TO RUN a dynamo, of whatever make, the commutator cylinder must be turned away from the ends of the brushes if copper ones are used. If carbon brushes are employed, it can be run either way, but proper lead must be given the brushes.

TO DRILL chilled iron take bicarbonate of soda, one-half ounce; bicarbonate of potash, one-half ounce; cyanide of potassium, two ounces; pulverize and mix; heat the drill bit to a light cherry red and apply power enough to look gray; cool in water.

A MAN or minor or corporation can legally hold 100 unpatented mining claims if sufficient work or improvement be annually done on or for each claim to comply with all legal requirements. The way to deal with the "claim hog" is to make him strictly comply with such requirements, or let go.

COLORADO sometimes assesses unpatented, unproductive claims at $500 each: California, usually, at $100 each, for taxation purposes. The figure of assessment on a producing property varies with the amount of common sense possessed by the county assessor.

SINCE the Southern Pacific Co. acquired the Carson & Colorado railroad the ore rate has been advanced from $6, the former charge, to $10 per ton, and the shippers who thought the old road charged too much now tell regretfully of old times, "when things were right."

THAT there is tin in California, Colorado and South Dakota is an established fact, but so far it has not been found in any one of the three States in sufficient quantity to be of commercial importance. Tin has been profitably mined in Tasmania for twenty-five years.

REGARDING the suggestion as to the order of drop in a 10-stamp mill in the issue of March 4, '99, a South Dakota correspondent thinks that 1-7-3-9-5-2-8-4-10-6 is a better arrangement, claiming that this order precludes possibility of the pulp accumulating at one end.

WITH a 4-inch drop a stamp occupies .154 of a second in dropping; with a 6-inch drop, .19 sec.; 9-inch, .233 sec. With a cam lift of 7 inches, ninety drops per minute, the time of lift and drop is .667 second; .297 sec. for the lift, .164 sec. for the rest, and .206 sec. for the drop.

IT is thought by millmen that a slight hollowing of the shoe helps the crushing capacity of the stamp, by tending to hold the pulp under the stamp instead of splashing it out. Irregular cupping is not considered, but an even, gentle hollowing out of the face of the shoe.

GLYCERINE used by powder manufacturers now commands 13 cents per pound. At ruling rates for the manufactured product that means an average profit to the powder manufacturer of about 25 cents per case. Glycerine at 10 cents—the former price—would admit of a profit of about 50 cents per case.

IT has been decided by the Supreme Court of the State of California—Morse vs. De Adro, 40 Pacific Reports, 1018,—that the statute securing a lien on mining claims for labor performed thereon does not authorize a lien for labor in working a mine or lands held under an agricultural patent from the United States.

AFTER issuance of a U. S. patent to a placer claim any lode thereon goes with the patent and can not be made the subject of any adverse action. If the lode be discovered within the limits of the placer location before issuance of such patent it may be located, and so far as it is concerned the placer location would have to yield to it.

A SLIME TABLE may be considered as an improved buddle. Its advantages are continuity of action, ability to deliver a finished, a middle and a waste product, requiring little technical attention, low requirement of power, and ability to handle pulp containing considerable water, as usually the case with battery or fine jig tailings.

"GABBRO" is a granular intrusive rock, consisting, principally, of diallage or allied monoclinic pyroxene, or rhombic pyroxene, together with soda lime and lime feldspars. "Gabbro-diorite" is a term indicating areas of gabbro containing primary and secondary hornblende and areas containing intimate mixtures of gabbro and diorite.

WHOEVER takes a check upon a bank in his own town should present it for payment on the day he receives it or on the next day. During these two days the drawer of the check guarantees the solvency of the bank upon which it is drawn; but after that the risk must be borne by the check holder. This is the rule enforced by the courts of all the States.

THERE are but two Government institutions authorized to receive ores for assay, one at Deadwood, S. D., and the United States Assay Office at Charlotte, N. C. It is not the policy of the Government to enter into competition with private assayers, therefore the charges at those Government institutions are fixed at $3 for gold and silver; other metals the same.

AT any time prior to the issue of the receiver's receipt, in patent proceedings for a mill site, should mineral be discovered within the located boundaries of such mill site in sufficient quantity to justify exploitation, a valid mining claim can be located thereon, if in good faith and for bona fide mining purposes, regardless of whether the mill site has or has not been abandoned.

THE specific gravity of a body is slightly altered when enveloped in compressed air. Any increase of density in the air slightly decreases the specific gravity. Air at mean temperature is nearly 800 times lighter than water; at fifteen pounds excess of air pressure its density would be doubled, and a body should have less specific gravity by $\frac{1}{800}$ of its value in the compressed air.

EXTENSIVE tunnel projects are not counseled by mining engineers in a non-fissure country, or where irregular deposits of blanket veins exist; nor in tellurium-bearing regions, owing to the possibility of tellurium ores changing at great depths to a worthless form of sulphide. In a fissure region, where sulphide ores predominate, as in parts of Colorado, the tunnel method is deservedly favored.

ONE may do annual assessment work on an unpatented mining claim for ten or any number of years, and yet the claim is subject to relocation if the required work is not so done for any calendar year. The idea of the annual assessment work is to keep the claim from lapsing, but without application for patent $10,000 in work and improvements would not hold a claim without working it.

PHOSPHATE is produced mainly in Tennessee and Florida. The total production of all phosphates in Florida in 1899 was 796,691 tons. Seventy per cent of the Florida phosphate rock is exported to foreign countries, notably to Great Britain and Germany In January, 1900, quotations were $8.50 to $9 per long ton at Fernandina, Fla., and $13.13 to $13.83 in British or North Sea ports.

IF 3% of acetylene be mixed with air, an explosive mixture is produced. In the case of hydrogen 5% is required, and for coal gas 8%. If gaseous acetylene under a pressure of two atmospheres or over be ignited by a spark it will explode without the presence of air, the violence of the explosion being proportional to the pressure. Its storage under pressure is a matter of extreme danger.

AN open circuit battery is one adapted for occasional or intermittent work only. Such a battery must be inactive when the circuit is open, and must have the property of depolarizing itself so as to be ready for use when needed. It may be very quickly polarized in use without detracting from its availability. A closed circuit battery must not be easily polarized in use, and may, and often does, polarize when not used.

WHEN molten lead is exposed, at high temperatures, to the action of a current of sulphur dioxide, both lead sulphide and lead dioxide are found in the product. On heating a mixture of lead sulphide and lead sulphate in a vacuum a reaction occurs, having sulphur dioxide as one of the products; the amount of residual lead sulphide and oxide being dependent on the temperature and the duration of the experiment.

BY a "unit of heat" is meant the heat that will raise the temperature of one pound of water 1°. At a temperature of 60° F., it would take 19.64 pounds of water to condense one pound of steam, the temperature of the resulting water being 120° F. A cubic foot of water at 70° F. contains 41,995.2 heat units. The chief aim of a modern steam raiser is to make as much of the surface of the boiler as possible absorb heat instead of radiating it.

PETROLEUM is the ideal smokeless fuel. It is also of economic value. One pound of petroleum will evaporate 18½ pounds of water at 212° F., or twice as much as the average evaporation obtained from coal in ordinary practice. With Pennsylvania petroleum 75% is capable of being made into refined oil, leaving 25% residues; with Russian petroleum the figures are exactly reversed, 25% made into refined oil, 75% residues. It is these latter that are burned. They have a fire test of 330°.

THERE can not be correctly applied such a term as a "copper placer mine," as the word "placer" implies a broken formation washed and deposited in the course of a stream. In Salt Lake county, Utah, and in one or two instances in Montana, what are called "copper placers" have been found, but the copper so procured has been demonstrated to be the result of copper in solution coming in contact with masses of carbon formed by decayed timber in the soil, which has precipitated the copper in a metallic form.

SO FAR as the mechanical question of pumping and hoisting goes, there is no insuperable difficulty in contemplation of successful mining at a depth of 10,000 feet, but it is believed that must be considered the limit of deep mining. The suggestion that mining may be possible "at a depth of 20,000 feet" seems unaccompanied by the reflection that the air at such depths would have such compression by reason of its own weight that a temperature of 60° F. at the mouth of the shaft would approximate 300° F. at the bottom.

LOSS of mercury should not ordinarily exceed 0.03 pound per ton of ore. Mercury should be fed to a quantity of about three times the weight of gold assumed to be in the ore. When inside amalgamation is taking place the mercury should be fed at regular intervals—say, every 2½ hours—into the mortar box. One way of feeding is with a wooden measure holding about one-half ounce, dipped in a bottle, closely stoppered, holding three to five pounds, drawn from the purifying mercury tank, and adding a little sodium amalgam, a piece the size of a pea, to every pound.

ORDINARILY a quartz vein of gold ore is a body of quartz occupying the entire width of the fissure from wall to wall, the ore body being either of relatively narrow extent in the center, or distributed in still narrower stringers through the quartz. In such veins "ore shoots" may be considered as long and more or less continuous patches or bodies of ore descending and following the downward dip of the vein, these often separated from one another by comparatively barren intervals, but all with a uniform direction of dip. These ore shoots are of varying length to 1000 feet.

CENTIGRADE is the simplest and best graduated thermometer. Fahrenheit continues in common use from popular inertia. An easy rule for converting Fahrenheit to Centigrade degrees, is: Subtract 32 degrees and divide by 2; then add to this $\frac{1}{10}$ of itself, and, if further accuracy is desired, $\frac{1}{100}$ more. For instance, if it is required to find the number of Centigrade degrees corresponding to 72 degrees Fahrenheit, subtract 32 and divide by 2, giving 20; adding $\frac{1}{10}$ more gives 22, and, for greater accuracy, another $\frac{1}{100}$ gives 22.2. The method is not as simple when applied to the reverse calculation.

Scrip and Law of Title to Oil Lands.

NUMBER III.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by A. H. RICKETTS.

The term "placer" appears to be used in the United States mining law as understood by miners and includes all forms of mineral deposits, excepting veins of quartz or other rock in place; this includes asphalt, gypsum, natural gas, petroleum and other non-metallic minerals. Instances of metallic mineral placer claims are those containing gold, tin and platinum gravels, iron, manganese and aluminum.

In a legal sense a placer location may contain any one or, say, all of these minerals. Frequently such a claim contains a "known vein," in which case such vein is subject to independent location; or veins not disclosed upon the surface may be found therein, in which case they are the property of the placer claimant. Hence, generally speaking, any unstratified or isolated mineral deposit within or upon the surface of a placer claim is sufficient for the purposes of a valid location and the right of the claimant is not restricted to any one of these. To illustrate: A claim located for and as a petroleum placer claim, and so stated in the notice of location thereof, but lacking actual discovery of ore therein, can be held for the deposits of gypsum, etc., it may contain. Unless required by some local rule or custom, it is not necessary to designate the character of the deposit inducing the placer location.

In his recent work entitled "Genesis of Petroleum and Asphaltum," State Mineralogist Cooper says, "Surface indications of the presence of petroleum consist of unaltered rocks, white-leached shales and sandstones, shales burnt to redness, fumaroles, mineral springs and the residue from mineral springs, such as selenite, etc., subsidences, natural gas, springs of petroleum oil and maltha, porous rocks saturated with bitumen, cracks in shale and other rocks filled or partly filled with bitumen, black silicified shales. * * * * * Outcrops and anticlines can be followed from outside property into the property being examined and the structure being considered sufficiently well demonstrated so as to justify a person in drilling wells for oil, even if bitumen were absent from the surface of the land upon which the well is to be drilled and the exposures of the strata are but slight."

But, under the law as it is administered by the land department, a claim located as a petroleum placer claim containing nothing more than such indications (which do not prove the existence of petroleum oil itself) would not be considered a valid claim, but subject the land claimed as such to agricultural entry as the land department insists that it must be profitably worked before it can assume the character of mineral land; that is, that a producing oil well must be situated within the limits of the ground claimed as a petroleum placer claim. How very far the land department carries that rule is shown in the following extract from one of its rulings, which by analogy applies to an oil claim, viz.: "The report of a deputy mineral surveyor upon land applied for as placer ground, that the soil was of sandy character, composed of disintegrated granite; that the mineral value of the land had not yet been proven, but that it was believed to be equal to that of the many other tracts which have been extensively worked in the district; that the ground was of no value for agriculture, townsites or timber; that there existed no workings thereon; that the surface was underlaid by a deep bed of gravel bearing placer gold, does not establish the mineral character of the land, as the existence of mineral as a present fact must be shown."

The following language from the opinion of Judge Ross in the case of the Nevada Sierra Oil Company v. Home Oil Company, decided last December, is apposite. That learned judge says: "But there were nothing more than the indications of existing oil under the surface of the ground in question, which might or might not prove to be true. Mere indications, however strong, are not, in my opinion, sufficient to answer the requirements of the statute, which requires, as one of the essential conditions to the making of a valid location of unappropriated public land of the United States under the mining laws, a discovery of mineral within the limits of the claim. Rev. Stats., Secs. 2320–2329, Waterloo Mg. Co. v. Doe (C. C.), 56 Fed., 685. Indications of the existence of a thing is not the thing itself. It is entirely true that the statute requiring as a condition to a valid location the discovery of mineral within the limits of the claim should, as between conflicting claimants to mineral lands, receive a broad and liberal construction, and so as to protect bona fide locators who have really made a discovery of mineral, whether it be under the statute providing for the location of vein or lode claims or placer claims. As was well said by Judge Hawley in Book v. Mining Co. (C. C.), 58 Fed., 106, 120, in speaking of vein and lode claims: 'When the locator finds rock in place containing mineral he has made a discovery, within the meaning of the statute, whether the rock or earth is rich or poor, whether it assays high or low. It is the finding of the mineral in the rock in place, as distinguished from float rock, that constitutes the discovery and warrants the prospector in making a location of a mining claim.' So, in respect to placer claims, if a competent locator actually finds upon unappropriated land petroleum or other mineral in or upon the ground, and so situated as to constitute a part of it, it is a sufficient discovery, within the meaning of the statute, to justify a location under the law, without waiting to ascertain by exploration whether the ground contains the mineral in sufficient quantities to pay. The question whether a particular piece of the public land is more valuable for mineral than for agricultural purposes is one that does not arise in cases like the present, which was one between parties who both claimed the land as mineral land. The question there was which of them had first made a valid location of the ground in controversy. While, as has been said, the statute requiring a discovery of mineral as one of the essential conditions of a valid location of land under the mining laws should be liberally construed in behalf of bona fide locators, no court would be justified in ignoring the statutory requirement. Mere indications of mineral, I repeat, do not constitute the discovery of the mineral itself. If so, a location made upon the discovery of such indications, followed by the proper marking of the boundaries of the claim and the doing of the statutory amount of work within the prescribed time, whether the work resulted in the actual discovery of mineral or not, would entitle the locator to apply for, and, upon due proof and payment, receive, the Government title to the land as mineral lands; which obviously would not only be unauthorized by any provision of the statute, but would be in direct conflict with the sections already cited." The authorities, however, are not harmonious upon the point that indications of mineral are not sufficient to warrant a location.

As said by the Circuit Court of Appeals for the Eighth Circuit in a recent case: "The Acts of Congress prescribed two, and only two, prerequisites to the vesting in a competent locator of the complete possessory title to a lode mining claim. (And the same rule is by the statute made applicable to placer mining claims.) They are the discovery upon unappropriated public land of the United States, within the limits of his claim, of a mineral-bearing lode, and the distinct marking of the boundaries of his claim, so that they can be readily traced. No appropriation of the land is made until both these requirements are fulfilled, and until that time the lode and land sought are open to location and appropriation by any competent locator; but, when these requirements have been complied with, the land is no longer public, but the possession, the right to the possession, and the right to acquire the title are irrevocably vested in the locator."

The Court proceeded to hold that, in the absence of any intervening rights, it is immaterial that the discovery is not made until after the posting of the notice and the marking of the boundaries of the claim, saying that the order in which the statutory requirements are complied with is immaterial so long as the rights of others do not intervene before they are complied with; that the marking of the boundaries of the claim may precede the marking; and, if both are completed before the rights of others intervene, the earlier act will inure to the benefit of the locator as of the date of the later, and a complete possessory "title to the premises will vest in him as of the later date," provided that the laws of the State or Territory and the local rules, regulations and customs of the miners of the district in which the claim may be situated are fully complied with as to all Acts concerning the locating and holding of the claim. Thereafter until patent issues the right to the claim is preserved from forfeiture by proper representation.

In the Home oil case above cited Judge Ross further says: "It is true that upon mineral land of the United States upon which there is no valid existing location any competent locator may enter, even if it is in the actual possession of another, provided he can do so peaceably and in good faith, in order to initiate a location for himself; but no right upon any Government land, whether mineral or agricultural, which is in actual possession of another, can be initiated by a forcible, fraudulent, surreptitious or clandestine entry thereon. Such entry must be open and above-board, and made in good faith. One who is in the actual possession of a mining claim, working it for the mineral it contains, and claiming it under the laws of the United States, whether the location under which he so claims is valid or invalid, can not be forcibly, surreptitiously, clandestinely, or otherwise fraudulently intruded upon or ousted while he is asleep in his cabin or temporarily absent from his claim."

But this doctrine is of but little avail to the average claimant of an unpatented mining claim, as he usually holds his claim by constructive, not actual, possession. It certainly gives no comfort to the large number of oil miners whose claims have been selected as agricultural land under the Forest Reserve law. They are compelled to show that the same, as a present fact, are more valuable for mining than for agriculture, although existing conditions show the ground to be absolutely valueless for the latter purpose. The absence of agricultural possibilities gives no strength to mineral probabilities and the good faith of the "scripper" is not considered material to the issue.

In the opinion of the writer, lands claimed as petroleum oil land, and which present such indications of the existence of that or other mineral oils that the claimant is willing to spend his time and money in exploring it in the expectation of finding such fluid minerals in paying quantity supported by expert testimony, showing that the land contains such indications as to make it likely that petroleum or other mineral oils will be found therein in paying quantities: or the fact that neighboring territory is producing oil and that the geological conditions warrant the conclusion that the oil stratum underlies the ground sought to be appropriated by the mineral claimant should be sufficient basis for a valid petroleum placer location or to withdraw such land from agricultural entry at least for a reasonable length of time, during which exploratory work should be prosecuted with reasonable diligence, or the claim be forfeited. But that is not the law, and nothing short of congressional legislation will make such conditions possible.

The Use of the "Baby" Air Drill at the Gold Bank Mine.*

Written for the MINING AND SCIENTIFIC PRESS by H. P. STOW.

In August, '98, the Compressed Air Machinery Co., 11–13 First St., San Francisco, Cal., made me a small drill on the same general principles of their larger or giant drill, the drill weighing about 100 pounds. The first drill was delivered the last of that month, the diameter of the cylinder being 2¼ inches, their larger drill in use at this mine being 3½ inches. The drill was tested through the month of November with satisfactory results, being used principally in the stopes, though it was tried in drifts and raises. I ordered four more drills of the same size, advising strengthening of various parts that experience had shown were weak, and on the first of the year '99 introduced them throughout the mine to do the stoping, with the result of reducing the payroll an average of $1500 a month. All the work is now done by the air drills, the baby drills doing all the stoping, and occasionally being used to run raises. They have been used with success in a drift where the formation was not too hard. I am at present using a baby drill to widen down the shaft, the shaft being originally an upraise from a crosscut tunnel. Most of the rock is hard greenstone, the small drill being strong enough to stand the work.

The drills as now made weigh about 105 pounds and are easily handled by one man, and as a rule the miners require no help in rigging up and getting ready to run. It frequently happens that a miner is sent from one part of the mine to another to change his place of drilling, and he shoulders his machine, takes his wrenches, etc., in his hand and moves about without any help from others, illustrating the ease and facility with which the machines can be used underground.

The mine does not run but six days in the week, while the mill (forty stamps) runs seven. The mill crushes an average of 3200 tons a month of hard quartz. I consider the quartz above the average in hardness. The stamps weigh 1000 pounds, drop 103 a minute, discharge through a No. 7 slot punched screen with low discharge, there being no inside coppers in the mortars. Four baby drills running day and night supply the mill with quartz. Of the average of 3200 tons a month, 580 were broken by the larger machines, leaving an average of 327½ tons a month, one shift a day, to the baby drills.

We always supply water to the miners under a pressure, running a water pipe wherever we run an air pipe, the work done by the drills and the time saved by the men being deemed to more than compensate for the extra expense. We used water here when we had to pump it out of the mine and know it is economy. We run our drills under an average pressure of eighty-five pounds. We use ⅞-steel for the short drills and ¾ for the long ones. Experience has taught us that the air required to run a 3½-inch drill under 85 pounds pressure will run three and a half baby drills. It may be of interest to know that the original baby drill is still in operation in this mine.

Forbestown, Cal.

See illustrations on front page.

THE publisher of any journal no doubt loses something whenever another paper enters the field which he covers; but if he loses something, his patrons and the interests he represents lose more. To secure a few advertisers, write a few general articles and issue a paper is one thing; to maintain steadily from year to year a policy of helpfulness, to write intelligently on technical questions and to secure a position where a publication is accepted as authority is not the work of one year, but of many years. No doubt a local pride misleads men in many ways, but in nothing is it more evident than in the trade newspaper line. A trade paper can not be local and live. It can not be a boomer of any locality and thrive. It must represent an industry and not a place.

Mount Whitney, Cal., Electrical Transmission.

Written for the MINING AND SCIENTIFIC PRESS by H. G. PARSONS.

The Mount Whitney, Cal., Power Company, headquarters at Visalia, Tulare county, Cal., is one of the latest of the extensive California electrical enterprises. The company began furnishing power to patrons July 1, 1899.

The water is diverted from the Kaweah river at Oak Flat, 45 miles east of Visalia, at an elevation of 2400 feet. The water for power purposes is taken through a tunnel, 47 feet long, through solid rock. The tunnel exit, where the wooden flume begins, is above the river and out of danger from high water. The entrance to the tunnel is at right angles to the river.

The flume is built over a rough, mountainous country; for 30,000 feet it meanders along the steep mountain side, in places over granite boulders and smooth bluffs, or along perpendicular cliffs, where points for its foundation timbers were blasted out of the solid rock. The flume has a uniform grade of 1 foot in 200—26.4 per mile—is constructed of redwood boards 1½ inches thick, is 3 feet wide and 2 feet deep, rests on 4x4 sills, spaced 4 feet apart, and is enclosed by posts and caps of 2x4 set at each sill. The cracks in the flume are covered with battens 4 inches wide and 1 inch thick, nailed on the inside. Here and there trestles are required to support the flume across ravines and rocky places. At intervals sand boxes and waste gates have been provided, so that any sand which might find its way into the flume can be disposed of before reaching the pipe. The carrying capacity of the flume is in excess of present needs.

The flume terminates in a sand box and overflow gate, at right angles to which an apron leads off to the penstock. The latter is 6x8 feet and 16 feet deep.

From the penstock a pipe line extends 3300 feet to the power house, making a perpendicular descent of 1300 feet in that distance. The pipe line is buried in a deep trench most of the way, particularly the lower 2000 feet. Starting at the penstock, the pipe is 50 inches in diameter, tapering to 24 inches in the first 50 feet. Then follows 2140 feet of riveted pipe, beginning with 24 inches inside diameter and tapering to 20 inches diameter. Then comes welded pipe, beginning with 20 inches inside diameter and tapering to 20 inches diameter. The thickness of steel in the pipe increases with the pressure it has to withstand. The riveted pipe begins with No. 12 gauge and increases to No. 1 gauge; the welded pipe begins with steel $\frac{5}{16}$-inch thick and increases to steel ½-inch thick. The welded pipe was put together with "bumped" joints instead of flanges. Four hundred feet from the power house the pipe, all but the joints, was embedded in concrete; at other points, especially where angles were made, or where the hillside was unusually steep, the pipe was fastened to the granite bedrock by iron bands and turn buckle rods. The pipe has six air valves in the first 1000 feet from the penstock.

The pressure registered at the nozzle in the power house is 565 pounds per square inch. Water issues from the waste nozzle in a stream as solid as a bar of iron, traveling at a velocity of over 17,000 feet per minute.

The power house stands parallel with the pipe line; the water is led to the wheels through passages of gradually decreasing area, so that the increase in velocity is uniform until the water issues from the tip of the nozzle. The gates which close the nozzles are of special design for the great pressure to be withstood, and are operated by means of large hand wheels through the medium of a worm gear. When the gates are open, a cylindrical aperture is always presented for the passage of the water. The water which is deflected downward by the cut-off device into the tailrace is received upon heavy cast-iron baffle plates and thence conveyed to the river.

The water wheels are mounted directly upon the shafts of the generators overhanging the bearings. They are solid steel castings, machine finished, weigh 1400 pounds each, with twenty bronze buckets bolted to each wheel. They are 50 inches in diameter. There is one nozzle to each wheel, equipped with a special cut-off hood, operated from a stand at the switchboard, so that the amount of water supplied to the wheel is at all times under the control of the switchboard attendant.

The electrical equipment consists of three Westinghouse kodak type three-phase alternating current generators, separately excited, slotted type continuous winding armature, 450 K. W. each, amperes 1020, volts 440, alternations 7200; speed 515 revolutions per minute. The water wheels are mounted on one end of an extended shaft having two bearings, a 4000-pound cast-steel flywheel on the other end, also a driving pulley for the exciter. The three generators gave a normal capacity of 1800 H. P. There are two belt-driven, direct-current generators of 15 K. W. each for exciters; speed, 1050 revolutions per minute; volts, 125. Each exciter has capacity to excite the three generators, and is so located that it can be driven from either generator nearest to it.

The switchboard consists of five marble panels, all 2 inches thick, 65 inches high and 24 inches wide, mounted on an iron frame. There is one exciter panel, three generator panels and one distributing panel, each equipped with approved modern appliances. From the generator and exciters all wires and cables are run under the floor in conduits to the switchboard, and from there in the same manner to the raising transformers. There are four raising transformers of 500 K. W. capacity each, oil-insulated, air-cooled. These are three-phase transformers, primary voltage 440, secondary 17,000 volts with coils in parallel, or 34,000 volts with coils in series. The secondary wires lead from the top of the transformers to the addition on the side of the power house, where the high-tension switches are arranged. The high-voltage current is then conducted to the lightning arrester house, located 25 feet from the power house. This building contains three lightning arrester units, each consisting of six choke coils in series with the line and thirty arresters mounted on a marble slab. Thence the current is delivered to the transmission line, consisting of three medium copper wires, No. 2 B. & S. gauge, arranged in the form of an equilateral triangle, one wire being mounted on the top of the pole and the other two on a crossbeam of 3x4 Oregon pine, boiled in oil.

About 21 miles from the power house the line is branched, one line going southerly through Exeter and Lindsay to Porterville, the other going westerly to Visalia and thence to Tulare. The distance from the power house to Porterville is 43 miles, to Visalia 29 miles and to Tulare 40 miles. The pole line is equipped with cross-



Mt. Whitney Power Co.: Tunnel Where Water is Diverted From River Into Flume



Flume, Kaweah River Canyon, Mt. Whitney Power Co.



Hoisting Pipe Up Mountain Side, Mt. Whitney Power Co.



Visalia Sub-Station, Mt. Whitney Power Co.

beams below the power circuit for telephone purposes, the Sunset Company having a contract for the use of the poles for this purpose.

Sub-stations are established at Visalia, Tulare, Exeter, Lindsay and Porterville, where the high-voltage current is received, and, by means of lowering transformers, is changed from a three-phase to a two-phase current of 2000 volts for distribution for light and power. The incandescent lighting circuits are supplied direct from the 2000-volt distribution and pole transformers to 104-volt secondaries. At present the power used at the different towns is as follows: Visalia, 344 H. P., 200 of which is for the Gas, Light & Heat Co., 50 for the water works and 30 for ice plant; Tulare, 90 H. P., 50 of which is for water works; Lindsay, 195 H. P., mainly for pumping plants and private lighting; Porterville, 105 H. P., 35 of which is for electric light works, 70 for Pioneer Co. and hotel. The price for 1 H. P. per annum is $50. Robert McF. Doble is consulting engineer.

Amalgamation of Metals, Normal and Electrolytic.

Written for the MINING AND SCIENTIFIC PRESS by J. H. JORY.

Events at Cape Nome within the past year have drawn new attention to the old subject of amalgamation. When the beach diggings were discovered at that place, it was found that though the sands contained gold in large quantities, yet the metal existed in such fine particles that to save any large percentage recourse must be had to amalgamation.

Plates were at once in demand. Copper was torn from the bottoms of wash boilers and other articles of culinary use, and old copper junk of every kind commanded fabulous prices. In lack of copper, tin plate and galvanized iron were used and some of the more opulent individuals covered the bottoms of their rockers with silver dollars on which to spread the mercury to amalgamate the gold. The subject of amalgamation being one of importance, and recent developments having lent it a new interest, there may be occasion for the presentation of some facts in connection therewith, for though there are many things concerning amalgamation which are generally well known, there are others with which even well-informed miners are totally unacquainted.

The process of amalgamation, as used in the extraction of gold and silver, was probably first used by the miners of Spain and was introduced by the Spanish into America at an early date. It is merely a modification of the more ancient method of coating inferior metals with gold, known as "fire-gilding." In this process the article to be gilded is amalgamated with a combination of gold and mercury, which, on the latter metal having been volatilized by heat, leaves the surface manipulated beautifully gilded.

Most of the metals are subject to amalgamation in a greater or lesser degree, but only two or three of these are useful for the purpose of saving gold by this process.

Gold has probably the greatest alloying affinity for mercury of all the metals, and being also the least subject to corrosion by water or gases it would stand first as an amalgamating medium were it not for its great cost.

Silver and copper have been found the most useful and practical metals for this purpose. The latter metal is readily amalgamated, but is subject to corrosion from atmospheric influences and from minerals or gases contained in the waters used. The oxides or carbonates so produced, flowing over the mercury employed, prevents its contact with the gold particles and makes amalgamation impossible; hence the necessity of silver plating. Many of the old copper plates used in the mills, however, have become so impregnated with the gold amalgam of years as to be a sort of fire-gilded and in this condition are superior to any silver plate that can be produced; for silver, itself, though admirably adapted for amalgamating purposes, is inferior to gold in that it is liable to be attacked by sulphurous gases.

Quicksilver dissolves several of the metals, in a greater or lesser degree, while entering into the combination known as amalgamation. A small quantity only of gold, silver or copper enters into solution, but some of the other metals, among which are tin and lead, are almost entirely dissolved, and when these metals have combined with mercury it is very difficult to restore the latter to its original, useful purity. Under normal conditions nickel and iron are extremely difficult to amalgamate, and the condition is of little value when it has been obtained. Zinc is easily subject to amalgamation, but the basic carbonate soon rises to the surface and destroys its usefulness as a medium of presenting mercury to its affinity for gold. In the form of galvanized iron it becomes disintegrated in a short time when alloyed with mercury, and strips from the iron that has been coated by it. Tin plate is also soon destroyed by the application of mercury, as the coating of tin becomes dissolved and leaves the iron bare as an entirely useless surface. Attempts have been made to substitute German silver and other so-called "white metals" for silver plates, but as these alloys present the same difficulties as the metals of which they are composed nothing is gained by their use, except that, when sheets of these alloys may be obtained cheaper than copper, they may serve as a substitute for that metal as a basis for silver plating.

Some one, ignorant of its peculiar properties, has advised the use of aluminum as an amalgamating plate.

This metal, however, though not acted on by strong nitric or sulphuric acids, presents the most remarkable phenomena of all mercurial reactions in its great chemical affinity for quicksilver.

A sheet of aluminum rubbed with a little pumice and mercury becomes at once amalgamated; but in a few moments a most intense chemical reaction sets in. Great heat is evolved and the surface of the plate becomes rapidly covered with a thick efflorescence of a substance—in appearance and gravity—resembling wood ashes. This reaction can scarcely be checked by any means until the whole of the mercury has combined with the aluminum or the plate has become perforated.

In practical work, therefore, only two metallic surfaces are available for the purposes of amalgamation, viz., silver and copper; and as both these metals are liable to disturbing influences, constant attention to the keeping of the surfaces clean and bright is essential to successful amalgamation.

In this connection the manner of dressing the plates becomes of importance. Many amalgamators resort to such drastic measures in cleaning the plates that there is a constant occurring reaction, which not only gives much trouble, but also occasions loss. Mineral acids or sal ammoniac should never be used for this purpose except under extreme circumstances. Citric, tartaric, oxalic or other vegetable acids are generally strong enough to dissolve the oxides or carbonates derived from the copper or any sulphide that may discolor the silver. But better than either of the above is a weak solution of potassium cyanide, which not only dissolves the oxides, but also removes any slight coating of grease that may be present.

Amalgamation is only possible on clean metallic surfaces. This applies not only to the plates, but also to the particles of gold or silver that are to be deposited.

Grease, sulphuretted hydrogen, and other elements in the water may prevent amalgamation, as also may talc, graphite, lead, and other minerals associated with the sands. The gold itself is often covered with films of mineral substances, such as the alkaline silicates, and the oxides and sulphides of iron and copper, and is then said to be "rusty." At places near the seashore, and in other places where common salt exists, there is found on the placer gold another kind of coating which is produced by a combination of gold and metallic sodium, which forms a discolored, indurated surface and renders amalgamation difficult. This is a feature not before recognized, but as this has been fully demonstrated analytically and synthetically by the writer, and as the occurrence of this form of combination is very frequent in the Alaskan gold fields, it should be known, so that the difficulty presented may be the more easily dealt with.

Coarse gold may be saved by any of the numerous contrivances of riffles and pockets which constitute the invariable basis of every gold-saving machine that depends on gravity alone for its efficiency, but it is recognized by every miner of intelligence and experience that, notwithstanding the claims set forth by some projectors of such apparatus, a certain newly contrived stirring or a certain peculiar shaking "saves all the fine gold;" yet the fact remains that gold of such fine particles as that found on the beaches and tundras of Alaska can only be saved by amalgamation, and that by any other means not more than 50% or 60% can be extracted, even by the most careful working. It is also a fact that, while fine gold is often found disassociated from the coarse, yet where the coarse gold is found in any quantity the fine is discovered with it in almost equal value, so that in any case it may be seen that a thorough extraction involves amalgamation as at least a part of the process.

But, from what has been stated above, even amalgamation, as generally understood, provides a very imperfect process by reason of the unfavorable condition of the plates and of the surfaces of the particles to be amalgamated. In the recent form of "electrolytic amalgamation," however, the process may be said to have become perfected.

It has long been known that, under easily adjusted conditions of the electric current, metals in various forms and conditions might readily be amalgamated which, under ordinary circumstances, resisted that process. From this fact has gradually been evolved what might almost be called a new department in the science of electro-metallurgy. The system as now presented is not obscure. Electrolytic amalgamation follows closely the lines of other electrolytic processes. There is of necessity the positive and negative electrodes and the electrolyte through which these must react. Given the cathode of silver or copper, and, covered with mercury, a current such as will decompose water, is turned on. The flow of water carrying the sands, with particles of gold and mercury sufficient for its amalgamation, passes through and fills the space between the electrodes. All metallic particles in the fluid are drawn to the cathode, not only by gravity, but also in more or less degree by the course of the current flowing from the positive to the negative poles. But this is not all. By the decomposition of water, hydrogen is set free at the cathode and at once combines with the mercury on the plate and with the particles of mercury in proximity to that pole. A certain reaction takes place which much intensifies the amalgamating power so that even those surfaces, which under other circumstances are entirely indurated to mercurial affinity, now readily enter into combination with the quicksilver, and the particles of gold or silver amalgam become firmly adherent to the plates. When common salt is present, the action is still more pronounced. By the action of the current the salt is in certain small quantities decomposed and metallic sodium is formed on the cathode plate. This metal has a great affinity for both gold and mercury, and at once combines with both these metals, forming sodium amalgam and sodium gold amalgam. So intense is this action that the mercury appears to assume almost the fluidity of alcohol, and amalgamation takes place as with a flash. During this process, with an ample current of electricity, red litmus paper fastened to the cathode plate assumes a blue color, showing that some of the sodium has combined with the water to form caustic soda.

With the major reactions noticed, several other minor reactions take place. Where a combination of sodium has discolored and indurated the gold as found in the placers, the hydrogen amalgam at once combines to form hydrogen-sodium amalgam of gold.

Oxide films on the surfaces of the plates are at once decomposed, the oxygen entering into combination with the hydrogen to form water, while the reduced metals become amalgamated. A similar reaction takes place with the sulphide and alkaline coatings, and also with the carbonates, so that amalgamation may be produced under almost any condition.

Copper plates may be used for the cathode plates in electrolytic amalgamation, from the fact that under the electric current these are impossible of corrosion. When the current is discontinued, however, oxidation may take place, and for a few moments difficulty may ensue. It is therefore better, even in this process, that the plates be silvered. The anodes may be made of any suitable metal, not too easily oxidized and of fair conducting power.

Electrolytic amalgamation as described above is not only available for placer mining, but may be of great value as an adjunct of milling operations. It may be applied in a simpler form at little expense, and will enable operators to save considerable values that are now lost and make it possible to work certain ores which under other methods return no profits.

On the beaches and tundras of Alaska this season will find thousands of miners working with numberless antiquated and new-fangled machines, and by these crude ways immense quantities of gold will be extracted, but the heavy, steady output will come when these, having skimmed over the ground, are followed by the more scientific process of electrolytic amalgamation.

Some Recent Additions to the Collections of the California State Mining Bureau.

Gold in talc: Tunzi ranch, three miles east from Ione, Amador county, Cal.; W. H. Storms.

Chrysotile in diabase: Emerson shaft, Wildman mine, Sutter creek, Amador county, Cal.; W. H. Storms.

Selenite in very peculiar radiating groups of crystals: California.

Rich quicksilver ore, cinnabar and metacinnabarite: Spanish Belt, Nye county, Nev.; J. A. Yerington.

Pearl blue granite, cut and polished; A. L. Seager.

Gold quartz with bornite and chalcopyrite: Port Dick, Kenai Promontory, Alaska; Paul Buckley.

Gold quartz: Yun San mine, Korea; oldest mine in Korea; worked for 500 years to a depth of 400 feet; Col. J. E. Doolittle.

Auriferous pyrite rich in gold: from a large ledge on Selwyn river, Selwyn district, Yukon Territory, Canada; H. Marco.

Very fine specimens of molybdenite from a large vein which also carries gold and silver: Lake Chellan, Okanogon county, Wash.; J. E. Moore.

Gold quartz, high grade: from the mines of the Grass Valley Exploration Co., Grass Valley, Nevada county, Cal.; W. S. Keyes, M. E.

Black tourmaline in quartz and fine group of mica crystals: Grafton, N. H.; Chas. W. Livermore.

Gold quartz, rich in free gold: Michigan mine, near Gazelle, Siskiyou county, Cal.; Bert Martin.

Placer gold: from Anvil creek, Cape Nome, Alaska; J. M. Davidson.

Colemanite, pandermite, hydroboracite, etc.: from the new borate fields in Ventura county, Cal.; J. A. Comer. M. E.

Heavy wire gold in massive pyrite; a very uncommon and interesting specimen.

Talc and graphite of merchantable quality from Shasta county, Cal., and a number of other new specimens of cinnabar, copper ores, fossils, gold quartz, etc.

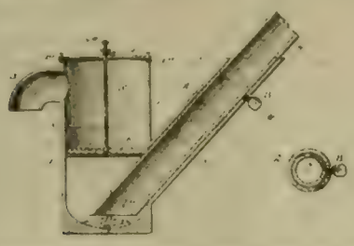
H. S. DURDEN, Curator.

Mining and Metallurgical Patents.

Patents Issued April 10, 1900.

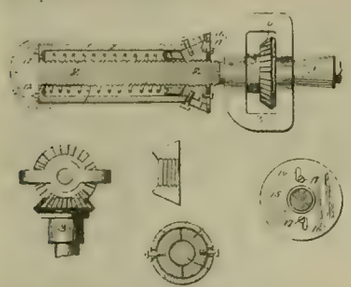
Specially Reported for the MINING AND SCIENTIFIC PRESS

AMALGAMATOR.—No. 647,011; A. L. Malone and H. Terwilliger, Portland, Or.



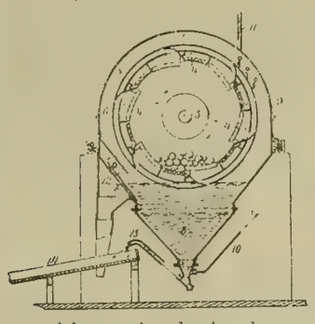
Combination with mercury holder having closed and internally concaved bottom, provided with detachable cap plate having boss, of horizontal flat sieve extending entirely across interior; vertically movable rod secured to sieve and projecting upward therefrom and through boss, provided with handle; holding device carried by boss and located to engage rod to thereby hold same and sieve in adjusted vertical positions; feed pipe, lower end of which is disposed below sieve; second and similarly inclined pipe telescopic in first-mentioned pipe, having its lower end disposed below sieve and its lower edge horizontally disposed; set screw carried by first-mentioned pipe, serving to engage and hold telescopic pipe.

BORING IMPLEMENT.—No. 647,311; W. T. Maxwell and G. J. Spahn, Baltimore, Md.



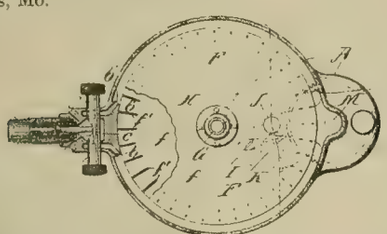
A boring implement, combination of right-angular frame 3, threaded bit-carrying shaft and driving shaft arranged at right angle, and meshing gears for rotating them, a tubular back bearing 9, a divided, or two-part, nut in which the threaded shaft works, the same being seated removably in the front end of such back bearing.

BALL GRINDING MILL.—No. 647,336; H. L. Sulman, London, England, assignor to F. Krupp, Magdeburg-Buckau, Germany.



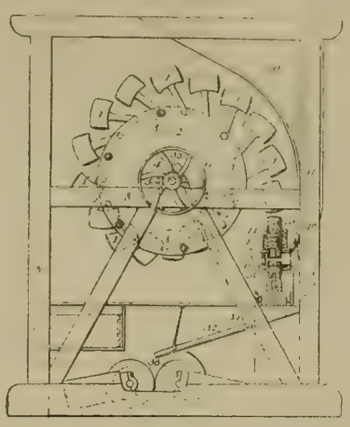
A mill comprising casing having lower part providing water trough, water supply pipe leading to lower part of trough, discharge pipe adjustable in length for regulating height of outlet and extending from lower part of trough beneath supply pipe, means for determining level of water in trough, and a ball drum having grinding plates, and mounted so as to dip its lower sieve part only in water contained in trough.

PNEUMATIC DRILL.—No. 647,265; J. A. Hoff, St. Louis, Mo.



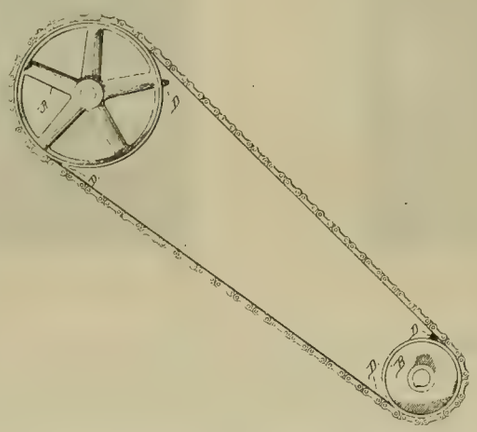
The combination with valve casing having suitable ports, of valve C having a V-shaped reduced portion, which reduced portion likewise establishes communication between central chamber and ports on each side thereof, a spring-pressed tooth mounted on valve C and a notched face on valve casing, with which spring pressed tooth co-operates.

STAMP BATTERY.—No. 647,057; M. Weber, Adelaide, South Australia.



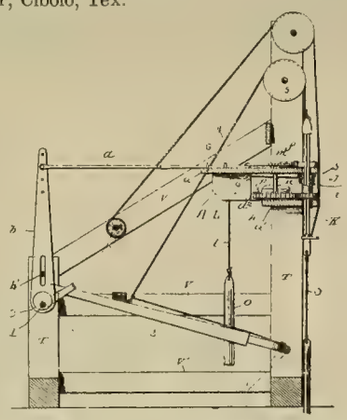
A stamp battery consisting of supporting frame, hammer wheel composed of a multiple of circular plates connected by bolts, multiple of swinging hammers hung on bolts and means for applying power to wheel in combination with stamp box of two compartments composed of oscillating anvil blocks forming bottom, plates forming sides, ends and top, and an intermediate plate, top and intermediate plate being provided with corresponding apertures, disconnected vertical stamps mounted in apertures of box provided each in its upper portion with collar, circular spring surrounding stamp between collar and intermediate plate, oscillating anvil blocks having each in its center a downwardly projecting stem and pivoted oscillating levers below.

CHAIN BELT GEARING.—No. 647,243; J. C. Anderson, Highland Park, Ill.



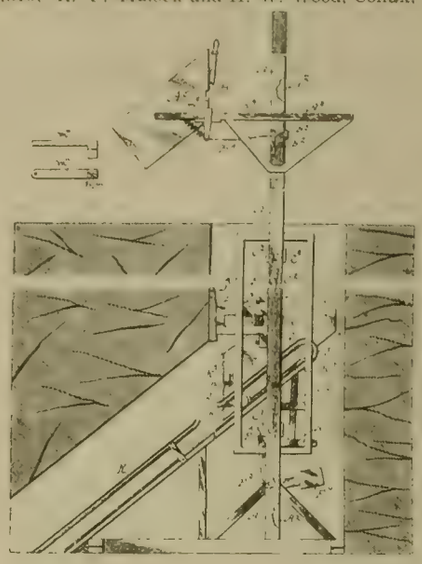
In a chain-belt gearing, a sprocket wheel having sprockets predeterminedly farther apart than pitch of chain links, in combination with a sprocket chain, links of which are uniform in pitch and the number of which is more or less than an exact multiple of number of sprockets on wheel.

WELL DRILLING MACHINE.—No. 647,348; F. R. Wiedner, Cibolo, Tex.



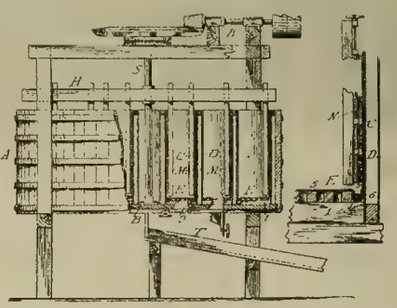
A well drilling machine, combination with frame, of main drive shaft mounted therein, casing carried by frame, rod k extending through casing and connected with drill rope, pinion i mounted on rod, having a drum j secured thereto, weight o attached to drum, mutilated gear h, meshing with pinion, ratchet f actuating gear, an oscillating lever actuated by main drive shaft, and rod d and pawl d′, operatively connecting the lever and the ratchet f.

APPARATUS FOR ELEVATING ORE FROM MINES.—No. 647,316; R. P. Mulock and H. W. Wood, Colfax, Ia.



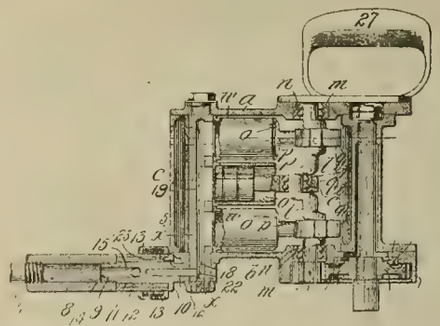
Apparatus for elevating ore from an inclined shaft intersecting a vertical shaft, a cage consisting of a four-sided frame, an oblong frame fixed to the four-sided frame, projections at parallel sides of oblong frame adapted to engage parallel uprights in vertical shaft, double rails fixed in cage frame in an inclined position, auxiliary frames fixed to cage frame, roller mounted in auxiliary frames, and means for fastening cage at its bottom to parallel uprights in vertical shaft, arranged and combined to operate in the manner set forth, the cage having fixed inclined track rails, a car adapted to be supported on rails and provided with cam on its under side, hooks pivotally connected with parallel uprights in vertical shaft, lever fulcrumed to cage and adapted to be engaged by cam on bottom of car, frame connected with lower end of lever and adapted to engage hooks and means for normally retaining hooks in engagement with cage.

LEACHING TANK.—No. 647,358; D. W. Balch, San Francisco, Cal.



In a tank for the purposes described, and in combination, the tank wall, bottom, and perforated false bottom, vertical screens extending through false bottom, space between each screen and adjacent false bottom, textile covering for false bottom having edges turned into space, a textile covering for each screen having its edge turned into space, rope forced into space above textile edges for holding them in place.

PNEUMATIC DRILL.—No. 647,455; E. C. Meissner, St. Louis, Mo.



Combination with casing of spindle fixed therein and provided with inlet and exhaust ports, cylinders mounted on spindle, pistons in cylinders, crank shaft with which pistons engage, plug mounted on end of spindle and provided with ports in registration with inlet and exhaust ports of spindle, and rotary valve comprising sleeves 11 and 12, and a muffle 13, which are secured together and adapted to rotate on plug for admitting or exhausting pressure to or from either of spindle ports.

Southern Oregon Placer Conditions.

Written for the MINING AND SCIENTIFIC PRESS by THEO. F. VAN WAGENEN.

The hydraulic mines of the placer region of northern California and southwestern Oregon, near Galice in Josephine county in the latter State, are deserving of notice. The discovery of the extensive gold fields of this vicinity, extruding through the counties of Siskiyou, Trinity and Humboldt in California and Josephine and Jackson counties in Oregon, followed quickly upon the first rush into California in 1849. As early as 1850 gold was found in Althouse creek, one of the tributaries of the Rogue river; and for several years, while the tide of discovery was running high, the output of gold rivaled that of many parts of the more extensive auriferous region in central California. But the valleys of the Klamath and Rogue were carved out upon a different plan from those of the lower Sacramento and San Joaquin, the result of which was the deposit of much less alluvium along the former than the latter. In consequence, the primitive methods of mining in those days yielded large profits but a short time in the northern districts, and by 1855 the bulk of the roving population had drifted northward to the Columbia and Frazer rivers and eastward towards Idaho and Montana, where later equally rich discoveries were made.

The geological situation in the region under consideration is interesting. Where now stand the rugged and picturesque Siskiyou and Rogue river ranges, built up upon a massive core of serpentine and slate, there used to be in former geologic time a broad and deep inlet from the Pacific reaching as far eastward as southwestern Idaho. Into the head of this the Snake river, which now heads in Wyoming and empties into the Columbia, poured its floods. The coast lines of the ancient gulf may to-day be traced with considerable accuracy, and they indicate a comparatively narrow inlet from the ocean at about the region of the Oregon-California line; a broad interior basin with an average diameter of fully 500 miles, along which numerous bays extended in several directions towards the center of the continent, connecting probably with the Humboldt and Salt Lake basins and certainly with the region now known as the Snake river desert.

The series of seismic disturbances which later elevated the floor of this extensive gulf and covered much of it with vast beds and ridges of lava, forcing the Snake northward to a junction with the Columbia and sealing the outlets of the Humboldt and Salt Lake basins, is a story which when rightly deciphered by the geologist will prove not only interesting, but economically valuable; for, during these changes, very large marine deposits of auriferous conglomerates were formed in northern California and southern Oregon, not very dissimilar in character to those at Johannesburg, South Africa; and great dikes of auriferous diorite were thrust upward through the earth's crust near the present Pacific coast line; both of which have been the immediate source from which came much of the gold being at present recovered in this region.

One of these latter has been traced almost in an unbroken line through southwest Oregon, from Riddles to Waldo, a distance of forty miles. So persistent is this fissure and so straight its course—from N.E. to S.W.—that it probably marks the line of a fault plane; east of which the country slowly was elevated, while west of it there was as gradual a subsidence. Parallel to it and so close that the two may be said to adjoin—for they are never separated by more than a few rods—is what is locally called an ancient river channel, but which actually consists of a deposit of small breccia and soil from 50 to 150 feet in depth and from 500 to 2500 feet wide, through all of which gold is disseminated to such an extent that its yield when the channel is worked in large quantities averages between 15 and 20 cents per cubic yard with great uniformity.

As might be expected from its soft nature, this gold-bearing channel has been very extensively eroded and washed away. Wherever crossed by a river, a gulch or a ravine it is totally gone, while its golden contents have been caught and concentrated in some part of the newer channels below, or swept westward to the ocean, there to be thrown up on the beach and form the profitless diggings of the gold coast. Only fragments remain here and there; yet these fragments may be and have been traced and found by the prospector in his tramps across the country, and, whenever extensive enough to offer a commercial basis for a mining enterprise, have been taken up and are being worked.

In the vicinity of Galice, south of the point where the Rogue river has cut its way through the dyke to the canyon, the gold-bearing deposit, crossing the gorge diagonally, rests upon a slate bedrock 50 feet above the surface of the water.

The word "channel" does not convey a correct idea of the nature of these deposits. Although the slate bedrock appears to have a fairly uniform slope of about 15 feet per mile, within the limits of this property, at least, from south to north, and although its surface is worn smooth in the same direction, as if by the action of moving gravel, yet the mass of the material is in no sense a water deposit, nor is any considerable proportion of the rock fragments it contains water-worn. On the contrary, they are for the most part angular pebbles, scattered irregularly through a mass of soil, which near the surface is deeply stained with red and yellow iron oxides and consists mainly of clay. In some of the blocks there is evident stratification of the material; but the planes of these earthy and gravelly beddings slope from the west to the east across the course of the channel, and not from south to north along its length. So far as I have been able to discover, the eastern wall of the channel is gone, or, more correctly, seems never to have existed; so that the floor upon which the auriferous material rests is a shelf of varying width, bounded on the west by the wall of the dyke or by a nearly vertically tilted uplift of the slate bedrock resting closely upon the dyke. The following section across is through one of the blocks of ground lying between Rich and Applegate ravines, locally known as Thoss Flat, is typical.

After several examinations of this interesting deposit, I am unable to account for the gravel, earth and breccia which constitutes its mass; but the gold appears to have come in a state of solution from the diorite dyke to the west. The auriferous nature of this dyke, which bears the name of the "Old Yank lode," has long been known to the miners of the vicinity. Again and again it has been located by enthusiastic prospectors and exploited by shrewd stock speculators, but I can not learn that a dividend-paying era has been attained anywhere along its length.

In the Alexander & Bent property, herewith illustrated, of the 750 odd acres nominally included within its patented lines, about half have been washed away by the numerous ravines and gulches that cross it, and fifteen to twenty acres of the various blocks between these have been washed since it was first located by the various owners. As nearly as can be learned, the yield under operation has ranged from $5000 to $10,000 per acre, according to the depth of the banks. This corresponds to a production of about 15 cents per cubic yard. The costs have varied from 3 to 5 cents or more per yard, according to conditions. When well equipped, the first-named figure should be the maximum.

Water for operation is furnished by Galice creek. Fifteen miles of ditches collected it, but only eight miles are in use. The available watershed above the levees of these is about thirty square miles. Over that area the annual precipitation averages 40 inches, so that quite 4000 inches of water is available. The season for working is about eight months.

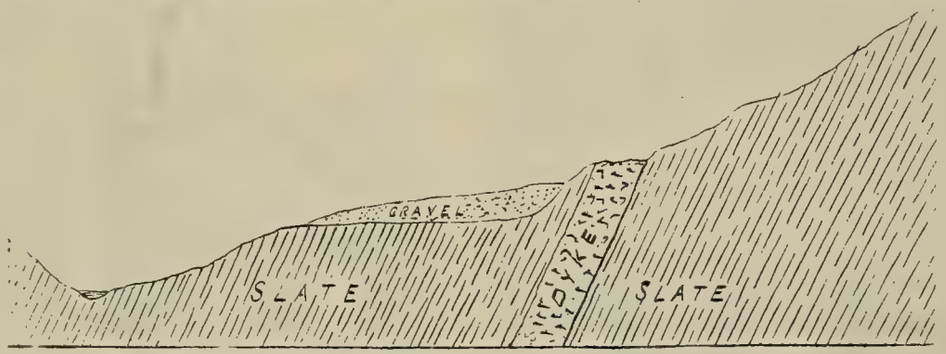
At the present time the mine is only partially equipped. Not over 2000 yards per twenty-four hours is being washed. The principal operations are carried on at a point near the northern end. Fig. 1 shows the working pit. Fig. 2 is a near view of a piece of the bank shown in Fig. 1, which displays not only the cross-stratification of the mass, but its remarkable freedom from boulders. The climatic and other conditions in the Rogue River valley are peculiarly favorable for hydraulic mining. The altitudes of the deposits above sea level rarely exceed 1200 feet. The winter, which is the mining season, is mild; the rainfall is very rarely deficient, and the deep canyon of the river with its great volume of water and regular fall carries away all tailings to the ocean.



Fig. 1.—Working Pit, A. and B. Placer Mine, Josephine Co., Oregon.



Fig. 2.—Close View of Banks in Working Pit, A. and B. Mine, Josephine Co., Oregon.



Typical Cross Section Through Block of Ground at Thoss Flat, Josephine Co., Oregon.

PROFESSOR DEWAR, who liquefied hydrogen a year ago, is now producing hydrogen as a solid. Discussing the question of the futility of solid hydrogen in scientific research, he says the mere fact of its transformation from gas is interesting because it is the elementary body of the lowest atomic weight. One of its uses was in the solidification of oxygen and it could also be used in the separation of mixed gases.

Some Observations on Practice of the Cyanide Process at Mercur, Utah.

Written for the MINING AND SCIENTIFIC PRESS by WM. MAGENAU, E. M.

The cyanide process has now had over ten years of application in the Mercur district, and the almost ideal adaptability of most of its ores to this method has led to a steady growth in its milling facilities, until at present about 3000 tons could be treated and about 1800 tons are actually being handled per day. This wide disparity between possible and actual mill output is due to a recurrence of the old error of building an elaborate reduction plant before the mine has been developed, this naturally resulting in a number of abandoned mills, some of them well designed and built. The ability of the larger concerns to treat at a profit exceedingly low grade ore (as low as $2.80 per ton in some cases) seems to have been a dangerous bait to many operators. If their mine showed an average of values but slightly above the minimum treated profitably by the 500-ton-a-day companies, a big mill was immediately put up, with the frequent result of a drop in average to just below pay when the attempt was made to bring the tonnage up to respectable figures. Those companies, however, which proceeded on the more logical lines of developing their mine first, and those which had the good fortune to encounter good ore bodies after taking the venturesome step, have had most encouraging commercial success. The dividends drawn so far amount to nearly $2,000,000.

In its technical aspect, the process has not been materially improved at the hands of its users, the single case where thoroughly qualified professional talent and good facilities for investigation have been provided being under private ownership and all details withheld from the public. The great ease with which a fair, and often a very good, percentage extraction is attainable from most of the Mercur ores has seemingly blinded the non-technical operators to the value of scientific research aimed to add to the proportion recovered and to reduce the amount of chemicals consumed, though very close attention is given to economizing on labor and construction. Just here we meet again the old bone of contention between the so-called "theoretical" and "practical" men as to the relative weight to be given these considerations. It all comes to a question of dollars and cents, and the discussion is a profitless one, but it is thought that in this district is exemplified another of the numerous instances where thousands have been squandered through the reluctance of "practical" managers and directors to pay for technical knowledge.

The ore bodies of the district, as is well known, consist of impregnated sedimentary strata ranging from pure limestone to shales and clays, with intercalated sheets of decomposed porphyry overlying the richer portions of ore shoots. The values in the typical Mercur ore consist almost entirely of gold, silver occurring only occasionally and in very minute amount. Silver ores are mined and cyanided in the closely adjacent Ophir district and will be briefly mentioned later. The gold values in Mercur may be said to range from $3 to $12 per ton, as given by H. L. J. Warren in an article to be mentioned later. Occasional assays run as high as $20 or $30, and very rarely reach $60 or $70. Immense bodies exist carrying from $1 to $2.50, which of course cannot be profitably mined as yet. A classification based on the mode of treatment may be made as follows, the names being those used by local mill men:

1. Oxidized Ore.—Consisting of lime, ferruginous shales, siliceous limestone, some decomposed porphyry, and all the common thoroughly oxidized materials of partially altered sedimentary strata. Probably two-thirds of the ore milled is of this class.

2. Base Ore.—This consists of similar material, but carries a considerable percentage as arsenic and antimony, sometimes as realgar, orpiment, stibnite, etc., but more often as mispickel. While base ore occurs in several mines, but one mill is equipped to treat it. It constitutes roughly one-fourth of total amount milled.

3. Talcy Ore.—This is fully oxidized like the first class, but consists of compact clays (locally known as talc) which disintegrate on contact with water, seriously impede leaching and prevent good extractions. Mills equipped with roasting furnaces leach it successfully after calcining.

4. Black Ore.—In one part of the district there are large bodies of a compact, dull-black material, known to be highly carbonaceous, which carries good values, but has thus far not been successfully treated.

In all of these ores we find a variety of secondary minerals of more or less interest and value. In the oxidized ore, cinnabar is comparatively abundant, its metal being extracted and precipitated with the gold in the course of treatment. At two mills this was sometimes expelled and condensed by retorting the mill product, and many hundred pounds of mercury have been thus obtained. This was later discontinued, and a few months ago shipments of product were being made carrying nearly 2% of mercury, which might have been profitably saved.

Realgar and orpiment are found in beautiful crystallizations, also more rarely native antimony. Curious crystallizations of ferrous sulphate occur. Millerite has been found. Variscite, a phosphate of aluminum resembling turquoise, is met with, and many other rarer minerals. Some of these undoubtedly exert an influence upon the solutions used; at least they are dissolved and appear in the "product," as the gold precipitate is called.

In the outline and notes that follow, the treatment of the oxidized ore is referred to, since the remaining important varieties are treated by only a single mill (the De Lamar, which is well described in the Eng. and Min. Jour. of Dec. 30, 1899, by H. L. J. Warren).

The mesh of the screens in most of the mills ranges from 1 to 2; in only one case (De Lamar) is the ore crushed as fine as 4 mesh (the mesh numbers signify number of holes per linear inch of screen). This is the coarsest crushing anywhere practiced for cyanide treatment, and it is this feature which so materially lowers the cost of treatment. The ore being friable, immense tonnages can be handled with simple appliances. In some cases only gyratory crushers and a single rotary screen suffice for over 200 tons per day. The usual practice is to have a gyratory crusher which delivers its product to rolls.

The accepted explanation for the amenability of these ores to treatment in such coarse condition, sets forth that the gold lies chiefly along the minute lines of fracture, and the solution follows these when the rock is immersed. As to the chemical effects of the various classes of ore, the millman has constantly to control the mine's output, especially where no roasters are used. The class called "oxidized ore" is practically all he can handle. The "base ore" will not extract without roasting, and, besides, often causes abnormal cyanide consumption, some of the arsenic being present as arsenious acid. Consequently, in most of the mines this is left in the ground, regardless of its high gold content. The "talcy ore," which also often carries good values, must be present only in very small proportion, since its presence in larger amounts lowers the percentage of extraction, not only by refusing to release its own values, but by preventing the washing out of the dissolved metal from the remainder of the charge. The "black ore" is, of course, not mined.

The ore, after comminution to the required mesh and sometimes mixed with quicklime, as will be mentioned under chemical considerations, is dumped from cars running on trestles above the leaching tanks, the latter having capacities varying from 16 to 250 tons each. The common ones are of from 30 to 50 tons capacity and are round with sheet-iron sides and 3-inch redwood bottoms. One mill has square iron tanks with wood bottoms, while the De Lamar plant is equipped with square all-steel tanks holding 250 tons each. Still another has an expensive installation of square "self-dumping" tanks constructed of iron and mounted on trunnions, the idea being to discharge the tailings into a bin below by inverting the tank by means of gearing operated by a man-crank. Each tank held 16 tons. The device might be useful for clean, compact material, but with the sticky, clayey ores here met with its operation was far from successful.

As to filter bottoms, a surprisingly simple arrangement seems to suffice. A number of mills handling a considerable proportion of stuff which disintegrates into impalpable slimes on wetting, use nothing but a single thickness of burlap laid on strips nailed onto the tank bottom, other strips to protect burlap from the shovels being placed at right angles to these on top of the burlap. As would be expected, this allows considerable of the slimes to drain off with the solution, but, while most of the solutions used are more or less turbid, the filtration is cleaner than might be thought. A few mills employ more elaborate filters and obtain crystal-clear solutions, but the presence of suspended matter is found to be a positive advantage, as will be further discussed in the remarks on precipitation. The space beneath the burlap fills up with fines in the course of several months, when the filter is taken up and replaced after cleaning. Depth of ore leached varies from 4 to 6 feet. Nowhere is a vacuum used for filtering.

There are commonly no measures taken to mix different kinds of ore before charging tanks, and while this undoubtedly results in channeling, a most surprising laxity seems to have but little effect on the extraction. Solutions are added indifferently from above or below. But one strength of solution is used, this being commonly applied in a series of percolations, the first one lasting about eight hours and subsequent ones being of shorter duration, the whole time of ore in the tanks being from 60 to 120 hours. The former is almost always sufficient; indeed, it seems to be the case that the gold is dissolved in the first few hours of contact and the remainder of the time is required to leach out the solution. This conclusion is reached from the fact that a number of leachings with cyanide solution give better extraction than a few percolations acting for the same length of time, and also from the observed importance of the manner of applying wash water. More direct evidence is had from the fact that in nearly every case where the values left in the tailings are abnormally high, a small sample thoroughly washed in the laboratory (by agitation and filtration) gives up excess over the normal amount retained. This is frequently caused by the presence of "talcy ore," as previously mentioned. As to what is a "normal" extraction, it may be said that on direct treatment of "oxidized ore" carrying from $3 to $5 gold per ton, from 70% to 80% is obtained, the common range being 72% to 76%. On ore running from $5 up, the extraction is normally above 80%, while with treatment of "base ore" after roasting, 90% and over is the figure.

The usual procedure in washing is to drain the last cyanide solution pretty well off, then run on a tankfull of water, draining this off—sometimes immediately and sometimes after standing—depending upon the capacity and condition of the sumps. The water pipes are of comparatively small diameter and the water is necessarily run on slowly. An improvement was made by spreading a canvas over an entire tank and flowing the wash-water rapidly upon this, afterwards drawing out the canvas. This allowed the wash to descend evenly through the charge and gave cleaner results. Another modification, curtailing the time devoted to cyanide leaching and devoting a corresponding amount to washing by allowing charge to stand with water and giving an extra wash, resulted in a marked increase of percentage of extraction. In this case it was necessary, however, to run to waste each day a certain amount of solution containing KCy and some gold, but this loss was more than counterbalanced. Usually the amount of wash-water applied is made to equal the amount of moisture retained by the tailings, so the volume of liquor in circulation is constant. All cyanide leachings and water washings are drained into a common sump and run through a single set of zinc boxes. As to the discharge of tailings, nowhere in the district is water plentiful enough to allow of sluicing them out, and the universal practice is to shovel into cars running on tracks beneath the tanks. This is commonly done by contract and costs from 5 to 11 cents per ton.

Coming now to a consideration of the method of precipitation employed, with one exception, the regulation system using zinc shavings disposed in rows of boxes is in vogue. The DeLamar plant uses a patented process of precipitation with zinc dust and compressed air agitation which is very successful and admits of the expeditious handling of enormous tonnage of solution. The zinc used for shavings is the ordinary No. 30 gauge sheet zinc, obtainable in "casks" of 600 pounds each. It is cut by wrapping six sheets (twelve pounds to sheet) around a wooden mandrel 5 inches in diameter, and bound tightly with heavy cord; the mandrel is then placed in a screw-cutting machine lathe, and a cutting tool held by the automatic carriage cuts the shavings from one end of the roll. With a mandrel geared to fifty revolutions per minute and cutting to $\frac{3}{1000}$-inch thickness, fifty pounds per eight-hour shift could be made, requiring only the occasional attention of the engine man to sharpen the tool. A speed of 100 revolutions per minute is also good, but the machine then requires more careful watching. Tools are always made of the brand of steel known as "musket," or "self-tempering," which can be sharpened on dry emery wheels.

A notable feature of the zinc-shaving precipitation here employed is the success in handling solutions very low in gold. And what is here called "very low" is far beneath the figures given by the adherents of electrical precipitation in South Africa as being the minimum for successful zinc treatment. Under normal conditions, the richest solution handled anywhere in the district carries only $3 or $4 per ton, while several mills operate with the pregnant solutions averaging from 60 cents to $1 per ton. The writer's experience with one of these weaker solutions was an average precipitation of over 90%. The zinc space employed was 1 cubic foot for every 3.5 tons of ore per twenty-four hours. The number of tons of solution passed through per hour was not determined, the amount being variable and influenced by the necessities of the leaching department.

(TO BE CONTINUED.)

Unaccompanied by Affidavits.

"Up at my camp near the Four Peaks," said Jim Bark to the Arizona Grapevine, "the boys are all handy with a rifle. We've a lot of guns up there. The old-fashioned black-powder Winchester has been discarded, and nothing but the best goes. Most of the new guns were bought during the Spanish war, when we could experiment all day with tree trunks and rough trenches, learning the art of war at home. We found that a bullet from one of the new Winchesters, driven by smokeless powder, was good for four foot and more of pine timber and for more than an inch of iron. I thought the boys had done about everything in the shooting line that could be done long ago, but I was mistaken. I sent them up a wagon. In hauling down some firewood they broke the bolsters all to flinders. The bolsters hold up the wagon bed, you know. Well, the boys figured out all right the rebuilding of the wood parts, but came near being stumped on the iron fixings. They got some old iron wagon tires and cut them in proper lengths, but hadn't a way that they could see to punch the necessary bolt holes. Finally the question was solved. One of the boys carefully marked the places for the bolts, stood the piece of tire against a tree and put a bullet, 30 caliber, through the tire at each place marked. It was a novel sort of blacksmithing, but it worked."

MINING SUMMARY.

ALASKA.

(Special Correspondence).— There are two 120-stamp mills on Douglas island. The two mills have twenty-two employes —eleven each—against twenty-three in the 300-stamp mill, quite a saving in labor. The 300-stamp mill is 1800 feet from the mine. It costs about 1 cent a ton for labor to haul the quartz from the mine to the mill. It is claimed that from the starting of the 300-stamp mill last May till the closing down on the 12th of December the cost of mining and milling was but 73 cents a ton. The 240-stamp mill of the Treadwell is included in this also, both together crushing 1950 tons a day. The 300-stamp mill runs only by water power and started on the 21st of this month.

Douglas Island, March 30.

Circle City reports a "mad rush" of 600 men from the camps along the American Yukon toward the new Koyokuk diggings. According to the transportation companies "$100 to the pan is a common thing at Koyokuk." That ought to be worth considerable to those interested in getting men up there.

The Alaskan civil code bill has the following amended provision: "That subject only to general limitations as may be necessary to exempt navigation from artificial obstructions, all lands and shoal water below mean high tide on the shores, bays and inlets of Bering sea, within the jurisdiction of the United States, shall be subject to exploration for gold and other precious metals by citizens of the United States or persons who have legally declared their intentions to become such, under such reasonable rules and regulations as the miners in organized mining districts may have heretofore made or may hereafter make, governing the temporary possession thereof for exploration and mining purposes until otherwise provided by law. Provided further, that the rules and regulations established by the miners shall not be in conflict with the mining laws of the United States, and all permits heretofore granted authorizing any person or persons, corporation or company, to excavate or mine under any of said waters, are hereby revoked and declared null and void; and the reservation of a roadway 60 feet wide, under the tenth section of the act of May 14, 1898, entitled 'an act extending the homestead laws and providing for the right of way of railroads in Alaska and for other purposes,' shall not apply to mineral lands or townsites."

The 18th inst. was devoted in the Senate to consideration of the bill of Stewart of Nevada opposing the above amendment. He talked three hours, reviewed the mining laws of the State to the extent that they related to aliens' rights in the Alaskan gold fields, and defended the rights of the Laplanders, Swedes and Norwegians who had entered mining claims in the Cape Nome district.

Nelson of Minnesota followed Stewart, also sustaining the aliens who had located the mining claims in question. Hansbrough of South Dakota interrupted Nelson to read a paragraph from a document drawn by the Law and Order League of the Cape Nome district, which declared that the people whom Nelson said had located the claims were not really the locators of the claims. In reply, Nelson denounced the Law and Order League as an organization formed to jump claims located by honest prospectors.

Tillman of South Carolina agreed with Nelson in what he had said of the right of the Swedes, Norwegians, Laplanders and Finns.

Carter of Montana made an earnest and forceful appeal to the Senate that the American miner—either native born or properly naturalized—should have the first claims upon the mining lands of the United States. He said in the course of his remarks that he had no desire to change the mining laws, but intimated that Teller of Colorado and others were trying to change them.

Teller declared that Carter, "under a pretended zeal for the American miners," had attempted to shift upon him the responsibility of a desire to change the mining laws of the United States.

After further discussion, the bill was laid aside.

ARIZONA.

W. P. Blake, at Tucson, places the output of Arizona copper mines in 1900 at 150,000,000 pounds. He predicts that within a short time the Territory will outrank Michigan and Montana as a copper-producing district. Through the death of John D. Emersly forty or fifty mining claims in Cochise Basin district have been made available for production.

GILA COUNTY.

The Old Dominion smelter has resumed work.

PIMA COUNTY.

In the Horseshoe basin, south of Tucson, fifty Indians are working the new gold diggings. Being within the reservation, whites are barred.

CALIFORNIA.

GOLD AND SILVER PRODUCT OF CALIFORNIA BY COUNTIES FOR 1899.

The Superintendent of the U. S. Mint at San Francisco has forwarded to the Director of the Mint, Washington, the following table of approximate distribution by counties of the gold and silver product of California for the calendar year 1899:

County.	Gold.	Silver.	Total.
Amador.	$1,544,868	$6,902	$1,551,770
Butte.	486,846	5,009	491,855
Calaveras.	1,265,564	9,813	1,275,377
Del Norte.	4,450	.....	4,450
El Dorado.	404,497	8,414	412,911
Fresno	18,142	.....	18,142
Humboldt.	69,059	.....	69,059
Inyo	114,187	57,529	171,716
Kern.	863,414	6,810	870,224
Lassen.	28,898	.....	28,898
Los Angeles	13,132	.....	13,132
Madera	73,758	292	74,050
Mariposa.	562,829	2,207	565,036
Mono.	697,069	47,547	744,616
Nevada.	2,171,510	17,784	2,189,294
Placer.	1,100,081	1,206	1,101,287
Plumas.	381,151	15	381,166
Riverside.	163,010	2,000	165,010
Sacramento.	115,906	.....	115,906
San Ber'dino	164,599	125,603	290,202
San Diego.	333,650	.....	333,650
Shasta	873,719	196,213	1,069,932
Sierra.	450,115	359	450,474
Siskiyou.	991,771	100	991,871
Stanislaus.	10,000	.....	10,000
Trinity.	590,510	1,086	591,596
Tulare.	13,610	.....	13,610
Tuolumne.	1,635,769	15,111	1,650,880
Ventura.	3,990	.....	3,990
Yuba.	189,927	12	189,939
Total.	$15,336,031	$504,012	$15,840,043

The silver is given in commercial value, or amount obtained for it by producers when sold. In the total for the year the commercial value of the silver is $504,012, as stated, the coining value, however, of this total being $1,106,578. It is noted by Mr. Chas. G. Yale, the statistician of the U. S. Mint at San Francisco, that, comparing the totals of gold and silver with corresponding figures obtained from the same sources in the year 1898, the gold yield of the State shows a decrease of $570,447 and the silver yield an increase of $89,957, making a net decrease from the previous year of $480,490, but that this is a very good showing in view of the dry season last year, when so many quartz mines had to hang up part or all of their stamps for a time, and when the water season for gravel mining was very short indeed. Considering these conditions, in view of the fact that the State nearly held its own in bullion product, it is seen that the mining industry is really progressing instead of declining in product.

Further analysis by Mr. Yale shows that of the total of $15,840,043, the value of combined gold and silver produced, the sum of $12,290,138 came from quartz mines, $1,128,564 from hydraulic, $1,019,955 from drift and $1,401,386 from placer mines. Included in the placer output is that derived from dredges, river bed and bar, gulch, ravine, and ordinary placer work by Chinese and whites. In the returns from quartz mines are included $353,743 gold and $210,219 silver, derived from copper mining and smelting operations in Calaveras, Shasta and San Bernardino counties. Also included in quartz returns are $5021 gold and $64,620 silver from silver-lead mines in the counties of Inyo, Mono and San Bernardino. Thirty counties of California produced gold, and twenty of these return some silver product. As nearly all the mines are gold properties, numbers of them make no return of silver or report the product as only "nominal." Nevada county is still the "banner" gold-producing county as it has been for some years, but this year for the first time Tuolumne county takes second place, displacing Amador county from that position. As compared with the previous year, Calaveras county shows the largest increase in product, though Mono county is not far behind in this respect. The largest decrease in production is in Placer county, followed in order by San Diego and Trinity counties.

The returns to the Mint show the employment of 18,701 miners in gold, silver, lead and copper mines of the State, a decrease of 1122 as compared with the previous year.

ALAMEDA COUNTY.

The H. M. Calderwood Placer M. Co. has organized at San Leandro; W. S. Peters, G. M. Flint, Oakland; C. H. Gray, C. H. Hale, H. M. Calderwood, H. G. Tassell, E. Richards, T. Morgan, W. H. Gray; capital stock $10,000; all subscribed.

AMADOR COUNTY.

To San Francisco on the 19th inst. was brought what the shipper says was sold to him for a meteor. The chunk weighs 1800 pounds and is locally considered valuable, as most of it is thought by the shipper to be copper. He says he bought it from a man in that county who told him that it fell from the skies about fifteen years ago, and many residents of that county say they remember a meteor falling there about that time. It is about the shape of a potato and seems to be of the usual composition of aerolites.

Effort is being made to buy the old Eureka mine at Sutter Creek from Mrs. Hetty Green.

The Mountain King mine at Pine Log has been bonded for $12,000.

Knight & Co. are building the new hoist for the Baliol mine.

A depth of 1675 feet has been attained at the Central Eureka, Sutter Creek.

At the Kennedy the new east shaft is down 1300 feet; the 40-stamp mill is in constant operation.

BUTTE COUNTY.

T. W. Reece, Supt. Amo hydraulic mine at Oroville, says active operations will be resumed on the property.

CALAVERAS COUNTY.

The Eagle G. M. Co., capital stock $60,000, H. S. Dawson, F. Cutting, G. Walker, E. W. Hayden, M. Folsom, W. F. Jordan, J. S. Mills, will operate at Cave City.

The Kentucky mine is being unwatered.

EL DORADO COUNTY.

(Special Correspondence).—The Grand Victory mine has again resumed operations, after being idle for several months. They are now crosscutting on the 300-foot level in good ore. At this point the ledge is over 60 feet wide.

The Larkin mine is running ten stamps and doing well.

Hayward & Lane have secured an extension to their bond on the Ribbon Rock, after the mine lying idle for about thirty days. The main shaft is being pushed down.

C. H. Dunton is opening some old claims to the west of the Live Oak and Marguerite mines. These old claims have been idle for about twenty years, and, in crosscutting from the tunnel level, he has 16 feet good milling ore. The Marguerite will resume operations about May 1.

The old Pacific M. Co. has bought two claims adjoining the Pacific on the east. This gives them all of the rights to the east vein which they did not before own. The old Pacific took out over $1,000,000 in the first 700 feet of surface workings. The property is owned principally in London; Henry Baring is Pres.

The thirty-day mill run on the Boulder mine has been finished and proved satisfactory to the new purchasers. It is said by one of the parties interested that the property will be taken up by the new company and work prosecuted more vigorously than heretofore.

Placerville, April 18.

NEVADA COUNTY.

The Dakota M. Co., to develop the Magnolia gravel mine at Forest City, has incorporated in Nevada City; capital stock, $30,000—all subscribed.

PLACER COUNTY.

(Special Correspondence).—The Dutch Flat Blue Lead Gravel M. Co. will take out rich gravel. Drift mining was done here before the days of hydraulicking; then came the little giants, with which the surface to a considerable depth was washed off; and when an injunction of the courts restrained this species of mining, recourse was again had to the drifting process. S. C. Jordan of Dutch Flat purchased the property several years ago for $25,000. His purchase included 110 acres in surface area; besides an hydraulic tunnel is driven through bedrock, which will drain the entire area into Bear river. Should hydraulicking be again permitted, this tunnel will prove valuable. Present development as a drift proposition consists primarily of a bedrock tunnel 800 feet long, extending from the hillside, where the mill is situated, to the east limit of the gravel channel. This tunnel is below the channel, and upraises have been put in at six places. Upraise No. 2, 450 feet from the face of the tunnel, has been extended to the surface as an air shaft. Upraises Nos. 3 and 4 struck pay gravel. At upraise No. 5, 22 feet above the tuunel, a drift 450 feet in length extends across the channel. Here considerable gravel has been breasted out and sent to the mill. Upraise No. 6 strikes the east rim of the channel, which, on the average, is 500 feet wide, and embraces a stratum of gravel 15 feet thick. The value of the gravel varies from 90c to $2.50 per carload. The gravel is blue, strongly cemented, and filled with cobbles as hard as flint. These are run through a rock breaker and are crushed with the gravel in a 10-stamp mill of extra heavy pattern, run by water power; four tons per hour can be crushed. Sacramento men have the property bonded. Wm. H. Bellows is foreman.

The Polar Star at Dutch Flat, formerly a hydraulic mine, then a drift proposition, is a hydraulic mine once more, working under permit of the Debris Commission, with a dam in Bear river. A spillway 40 feet wide has been cut at the side. The water going through the spillway is free of sedimentary water. The dam is 25 feet high, and will soon be raised another 25 feet. The Polar Star uses 2800 inches of water under 450 feet fall, the same being brought through 3500 feet of 22-inch pipe, and branching into two 15½-inch lines a short distance from the nozzles. One 8-inch and one 9-inch stream play against the bank at the same time. This makes a strong flow of water, carrying along by its force a large proportion of the boulders that plentifully abound in the gravel. At present the water and debris are taken through 600 feet of 5-foot flume on a 10-inch grade, and are dumped into the Little Bear river above its junction with the main stream, where the dam is located. When not going through this flume the tailings are conducted through 600 feet of bedrock tunnel leading directly to Bear river. There are two sets of 8 and 9-inch nozzles, one at each side of the mine, but only one set is used at a time. The company has insufficient water to keep the monitors constantly at work, so the water flow is confined to 2½ hours in the morning and 2½ hours in the afternoon. The work is profitable. The Southern Cross gravel mine, with a bedrock tunnel 1050 feet long leading to Bear river, adjoins the Polar Star and belongs to the same company, but is now idle. Wm. Nicholls Jr. of Dutch Flat is principal owner and superintendent of these mines; Geo. V. Nicholls, his son, is foreman; twenty-five men are employed. The Liberty Hill hydraulic mine, located in Nevada county, two miles above the Polar Star, utilizes the latter's dam, the two companies sharing expense of construction and maintenance.

The Gold Run Gravel Mining Co. is conducting a hydraulic mine in ground which was extensively worked in a similar manner years ago, one mile east of the town of Gold Run. The loose formation was hydraulicked to a depth of 100 feet over a large scope of territory, but in few instances was the bedrock uncovered. The present company is using two monitors, one a half mile below the other, and is doing good execution against a bank containing several strata, one of which is a blue gravel channel nearly 30 feet thick, lying next to bedrock. The tailings from each monitor go into a bedrock tunnel or flume 1200 feet long leading to Canyon creek, a tributary of the American river. Here is a log and brush dam, 65 feet high, built under permit of the Debris Commission. The water supply for the operations of the company is taken from the Bear and Yuba rivers, being brought 25 miles through the company's ditch, and is delivered to the monitors under a fall of 200 feet. A portion of the blue, cemented gravel can be run through a 10-stamp mill stationed near the lower diggings. The stock in the company is held by English people. J. E. Doolittle is general manager, Jas. Stewart of Dutch Flat superintendent.

The Inskip G. M. Co. at Gold Run has a permit to construct a restraining dam and is about to begin operations. As in the case of the Gold Run Co., they will resume at the site of an old hydraulic mine, and they have built a 25-foot restraining barrier 1½ miles below the diggings. They will employ a single monitor, with water under a pressure of 175 feet. The tailings will be conducted through a bedrock tunnel 535 feet in length, begun last October and just completed. Boulders and cobbles the size of a walnut and larger will be eliminated by means of grizzlies, and these will be taken by the Southern Pacific Railway Co., who will run them through a Gates crusher with a capacity of 15,000 tons per day, and will use the broken material as ballast for their roadbed. They will employ fifty to seventy-five men in handling this refuse from the Inskip mine. The mine itself will employ twelve men. The company is composed mainly of local people, with E. A. Moody of Gold Run as superintendent.

Henry Runckel is working by the ground sluice process a claim owned by himself and Mrs. H. R. Runckel, known as the Nary a Red, near the end of the old Alta channel. They bring 100 inches of water from Little Bear river to their reservoir, near the mine, and two or three times per day open the reservoir gate and allow the accumulated flood to wash down the bank. The claim is a good one and pays moderately.

The Paragon, or Breece & Wheeler, is a combination drift and hydraulic property at Bath, 3 miles from the town of Forest Hill. The drifts in this mine are connected with the workings of the Mayflower, which was at one time a very extensive gravel property. The two mines are on the same channel, which also extends to the Dardanelles, on the other side of the Mayflower. The original operators worked out the best pay in the cen-

ter of the Breece & Wheeler channel, and the drift work that is now being prosecuted is by lessees, who find good pay on the rims and upper leads. They have a tunnel 400 feet in length, bringing the cemented gravel to a 10-stamp mill, where water power under 400 feet head has recently been substituted for steam. The company laid 1100 feet of pipe in order to get the above head, and now run their mill with 15 inches of water. T. M. Brown and Wm. Rea Jr. are the lessees of the drift portion of the mine. In the latter diggings a 4-inch monitor is used, with a fall of 200 feet. They make three runs per day of about one hour each. Both portions of the mine are paying well. In the drift mine fifteen men are employed, and in the hydraulic about the same number.

Marchant, McDonald & Vennewitz have a bond on the Dardanelles mine at Forest Hill. This is an old drift mine which yielded well years ago, but which was considered worked out, so far as the main channel is concerned, and was abandoned. The present operators unwatered the old drifts and have put in an electric plant for the hoist and pump. They have been prospecting for six months and feel that they have demonstrated the existence of another channel. They are running a bedrock tunnel to intersect it, and within 100 feet hope to strike rich gravel. There is a 10-stamp mill on the property and the company has a reliable water supply for seven months of each year.

The Big Gun gravel mine at Michigan Bluff has a claim of 500 acres, part of which was hydraulicked in former years. They have a 11-inch pipe line 600 feet in length and throw water through a No. 2 monitor under a head of 200 feet.

The Michigan Bluff M. Co. is composed of Auburn business men. They are developing a gravel proposition adjoining the Big Gun by driving a tunnel through bedrock in the direction of the channel. This tunnel is now in 400 feet, and an upraise is being driven for an air shaft and to determine the value of the gravel at that point. The tunnel will be continued at least 400 feet farther. An old tunnel, 45 feet higher, 1100 feet in length, was run several years ago by a former company. M. H. Burns and three co-workers are driving the tunnel, having been employed since November last.

The Morning Star gravel mine is within a mile of Iowa Hill. Its underground workings are connected with the Big Dipper, which claim joins it on the south. It is thought they are on the same channel. The Morning Star tunnel is 4400 feet in length, with upraises to gravel each 200 or 300 feet. These upraises are usually 38 feet in height, and are divided into three compartments, two chutes for the gravel, with a ladder-way between. A shaft 488 feet deep gives excellent ventilation. The channel has an average width of 275 feet, and 500 carloads per week are extracted. The gravel is cemented and is put through a 10-stamp mill, run by water, with a steam plant in reserve. The company has its own storage reservoir, and by means of a pipe line 1200 feet in length obtains a fall at the mill of 450 feet. The Morning Star is one of the most reliable dividend payers in the State. H. T. Power is Supt.; H. Simons, foreman. About forty men are employed.

As before stated, the Big Dipper mine joins the Morning Star on the south, its mill being located about three miles from Iowa Hill. The tunnel is 4500 feet in length, being below but following in general the sinuosities of the ancient river channel, 500 to 600 feet wide, from which the cemented gravel is taken through upraises converted into chutes. A portion of the gravel is put through a rock breaker and is then washed, while another portion goes through rock breaker and a 10-stamp mill. This mill is run by water under 270-feet fall, while a 6-foot wheel operates an air compressor, which in turn furnishes power for the machine drills in the mine. A steam plant in reserve is usually resorted to from June to November, each year, while the water supply is low. The output of the mine is 725 to 900 carloads of gravel per week. About seventy-five men are employed. Seymour Waterhouse, Gen. Mgr.; F. H. Schulze, foreman.

John Watts, near Iowa Hill, owns the Strawberry gravel mine. He has driven a tunnel 2000 feet, following up the gravel channel, which is 50 to 60 feet wide. The gravel is blue, but free washing, and is yielding satisfactorily.

W. E. Pinkston, who has a bond on a copper claim owned by P. Oest, seven miles north of Auburn, is about to buy a gasoline engine and pump. Some of the unassorted ore from this ledge, worked by the Pioneer Reduction Co. of Nevada City, went 18.3% copper.

Iowa Hill, April 12.

PLUMAS COUNTY.

(Special Correspondence).—We have had to date 68 inches precipitation, 4750 feet altitude, 76 inches being the mean annual average. There is practically no snow below 5000 feet, and no snow masses of any size below 6500 feet, where the average depth is about 3 feet. A good season for water is expected.

Quincy, April 17.

At Crescent the Talbot-Fulton M. Co., capital stock $10,000, P. G. Stout, B. H. Talbott, J. M. Fulton, C. L. Taylor, J. E. Pardee, has completed a mill, has sixteen men employed, and will push development work and run the mill steadily.

Chapman & Macomber have under bond the Johnny Bull group, near Greenville, and will soon begin the erection of a mill.

SAN JOAQUIN COUNTY.

The Miocene Oil Co. has organized at Stockton; H. R. Campbell, H. T. Compton, H. C. Meyers, C. L. Ruggles, G. F. Bush; capital stock $75,000; subscribed $450.

SHASTA COUNTY.

The contract for the new smelter to be erected by Capt. De La Mar on his Bully Hill properties was this week awarded S. V. Trent. The undertaking involves a cost of about $100,000. The plant will be pushed to completion.

In London the Mountain Copper Co.'s shares are quoted at £8 to £8| per share. The capitalization of the company is as follows: Number of shares, 250,000; par value, £5; latest dividend, October, '99, 9s per share, or a total of $362,500. The stock quoted at £8 represents a capital of $10,000,000.

The annual report states that the quantity of ore taken out of the mine in 1899 was 203,965 tons, as against 221,895 tons in 1898 and 165,060 tons in 1897, while the quantity smelted was 176,689 tons, as against 168,541 tons in 1898 and 97,185 tons in 1897. The quantity of copper in matte produced at Keswick was 10,664 tons, as against 10,721 tons in 1898 and 7238 tons in 1897, and the output of fine copper at the New Jersey Works was 11,388 tons, as against 8273 tons in 1898 and 5958 tons in 1897, the increase being due to the working-up of the matte brought forward from the previous year. The finished copper sold for delivery during the year was 9647 tons, as against 8237 in 1898 and 6025 tons in 1897. At the close of the year there were large stocks of matte and fine copper on hand, the profit on which will come into the new year accounts. The net profit for the year was £335,110, compared with £136,234 in 1898. It is proposed to pay a further dividend of 11s per share, making 20s for the year, or 20%, and after placing £80,000 to reserve and depreciation account, a balance of £5240 is carried forward.

SISKIYOU COUNTY.

(Special Correspondence).—A singular accident occurred at the Gold Run mines at Gilta recently. Mr. McCloud, a miner, had fired a hole in the stope in which he was working, and had returned to drill another hole when a mass of ore fell. His skull was slightly fractured, two of his ribs were broken and one ankle joint entirely dislocated. It seemed as if the foot had been cut off square at the ankle, dangling by the skin only, though Dr. A. C. Helm, the mines' official physician, states that no tendons or arteries had been cut and that Mr. McCloud would be all right again in a few months.

The stopes of the Hunter vein keep the 10-stamp mill supplied when not occupied with ore from the winze, now sinking by power drills, in the lower tunnel. The winze is 120 feet deep; the 4-foot vein, mixed with waste, goes to the mill unassorted. Two feet of the vein is rated at $30 per ton.

Yreka, April 16.

SONOMA COUNTY.

Near Santa Rosa the Oakland quicksilver mine is producing forty flasks a month and the Cloverdale mine an equal amount. The Great Eastern at Mercury, near Guerneville, ships an average of 250 flasks a month. The combined output of the various mines is about 700 flasks per month.

TRINITY COUNTY.

E. A. Wagner, manager of the Dieffenbacher M. Co. at Coffee Creek is installing new machinery. The company is operating two drills in its mine and a 12-stamp mill.

TULARE COUNTY.

The Buena Fortuna M. Co. has organized at Visalia; B. Hicks, J. H. Newman, J. Fraus, A. Piderson, I. Goldstein, D. L. Clatfitter, P. E. Burns; capital stock $192,000; subscribed $200.

TUOLUMNE COUNTY.

Secretary A. N. Winslow of the Boston & Tuolumne G. M. Co. has returned to Boston. The main shaft is down 400 feet. Sinking goes forward at the rate of about 50 feet per month. When the 600-foot level is reached the various levels will be extended and crosscuts driven. The mine is in charge of Philip Deidesheimer.

COLORADO.

FREMONT COUNTY.

(Special Correspondence). — The improvements at the works of the National Gold Extraction Co., by which the capacity is being increased, are almost complete. A new condensing engine has been put in place, which drives a 275 H. P. electric generator, by which the entire mill will be operated by six different motors. A 30 H. P. motor will run the concentrators; a 40 H. P. and a 50 H. P. motor for the four sets of rolls; one 40 H. P. for the chlorine barrels; and two motors of 10 H. P. each for the furnace machinery. Besides the roaster which has been operating from the first, a Holthoff-Wethey roasting furnace has been added. Its size is 12x120 and roasts in the top chambers and cools at the bottom. To the roaster an automatic cooler has been added. Also three chlorine barrels have been added, making five in the mill, raising the capacity 180 tons per twenty-four hours. WASCOTT.

Florence, April 12.

(Special Correspondence). — The Colorado Electric Power plant at this place is equipped with three Westinghouse, three-phase generators, each 750 H. P., and run by a Hamilton cross-compound Corliss engine. The power is generated at 500 volts, transmitted 24 miles at 20,000 volts. At the plant are four step-up transformers and the same number of step-down in Cripple Creek district, where the power is used. WASCOTT.

Canyon City, April 13.

GILPIN COUNTY.

The Post says that within sixty days a good many miners will be needed in Gilpin Co., as a number of prominent mines are preparing to start up on a large scale, one of which will require from 125 to 200 men. About May 1 another will need forty to fifty; a third will put on new forces in about forty-five days; a fourth will increase on or about the first of next month.

LAKE COUNTY.

(Special Correspondence). — The Leadville & Red Cliff Power, Light & Water Co., has been organized by John F. Campion, Chas. Boettcher, S. W. Mudd, W. B. Page and Chas. Cavender. The purpose is to develop water power on Eagle river and put in an electric power station between Red Cliff and Minturn. At the proposed station it is estimated a water pressure of 750 feet will be obtained. One of the main objects in view is to be able to operate electric hoists in the Leadville district.

Leadville, April 12.

OURAY COUNTY.

A strike in the new Camp Bird tunnel is reported at 300 feet greater depth than the old workings. It is thought that next summer the Camp Bird and American Nettie will double their force of miners.

The Calliope mine at Ouray has been sold on bond and lease to a Chicago company for $300,000. The terms of sale require the expenditure of $30,000, and the sinking of the working shaft to a depth of 800 feet. The purchasers also agree to extend the development work a total of 2000 feet. The mine has been a steady producer for ten years, the ore being free milling.

PITKIN COUNTY.

H. B. Gillespie has charge of the Leadville mine at Lenado. He has a three years' lease and will place a hoist, operated by compressed air, at the tunnel level, where a station will be cut and the water taken out of the shaft. A four-drill compressor is now in place.

ROUTT COUNTY.

Steamboat Springs is attracting renewed attention. The placer mines at the western base of Hahn's peak are not as presently prominent as the recently reported copper veins of Columbia Basin.

TELLER COUNTY.

(Special Correspondence).—The Elkton Consolidated Co., capitalized at $3,000,000, has been organized to take over the Elkton, Raven and Tornado mines, all on Raven hill. The 3,000,000 $1 shares are apportioned as follows: To the Elkton owners, 1,375,000; Raven owners, 625,000; Tornado owners, 500,000; and 500,000 shares to go into the treasury of the Consolidated Co., to be sold to acquire new territory. By the consolidation costly litigation is avoided.

The Isabella is developing at the rate of 1800 feet per month, but no stoping is being done. President Nelson B. Williams announces that this policy of development and non-production will be kept up until better treatment charges shall be obtained.

The March shipments from the Orizaba brought $18,000. Two new boilers and a 10-drill compressor are being put in.

A shoot of ore has been opened in the Uncle Sam shaft at 195 feet, assays from which returned $130 per ton. This property is on Bull hill and belongs to the Blanche Co., which purchased it at $65,500 several months ago.

Cripple Creek, April 15.

IDAHO.

SHOSHONE COUNTY.

The Mountain Summit M. Co., with headquarters at Wallace, is being organized to work the Rialta, Pedicord and Minnie claims, 4 miles north of Burke.

MICHIGAN.

One hundred miners at Franklin Junior, at Houghton, have struck for 10% raise in wages. The manager had raised laborers' and trammers' wages $2 and $2.50 per month, about 5%, on April 1; present wages are $49 per month for common labor, $52 for trammers and $54 for miners As at other lake mines, best miners work principally on contract and average higher wages than paid men working on company account.

MONTANA.

CASCADE COUNTY.

At Neihart the Silver Belt M. Co. has organized. Its property is at the head of Rock creek. Capitalization $25,000. The Silver Belt lode is a north extension of the Broadwater group. It is developed by open cuts and shafts, all the entire course of the main vein showing a ledge 6 to 8 feet in width, carrying high-grade ore.

FERGUS COUNTY.

The order by the Gilt Edge M. Co. that all single men employed at the mine and mill board at the company boarding house has caused several to quit.

PARK COUNTY.

Livingston argues that a smelter there would prove to be a paying investment.

NEVADA.

LINCOLN COUNTY.

(See illustrations front page.)

(Special Correspondence).—The material for the equipment and improvements at De Lamar was freighted by wagons from Milford, Utah, a distance of 170 miles. The building of the Utah & Pacific from Milford to Uvada in 1899 places De Lamar within seventy-five miles of the railroad. While no special announcement of intention has appeared, it is generally understood that the Utah & Pacific will be extended southwestward this year through Lincoln Co., Nevada, toward the California line. When this county shall have been made more accessible by some such transportation line, more thorough prospecting and development of its mining resources will be possible. It is a section requiring considerable capital with which to operate, not alone for the mining and milling features, but for the development and distribution of water supplies.

What may be called the De Lamar district takes in an area of about fifteen miles east and west by twenty miles north and south, wherein, the local records show, there are nearly 1300 mining locations, the first having been made in 1891. The De Lamar group extends across what is locally known as Lookout mountain, covering a great quartzite lode, which trends nearly north and south. The property is opened through a series of tunnels, cutting into the mountain one above another, following the strike of the mineral zone northward. The formation is a quartzite, being about 80% silica, and is somewhat broken by porphyry dykes cutting diagonally through the otherwise regular quartzite strata. While the mineralized shoots are referred to as veins and ledges, there seems to be an absence of distinct walls or vein matter distinguishable from the regular formation. To illustrate this, it may be cited that experienced miners employed in the mine are unable as a rule to discriminate between ores of high grade and those carrying practically no values. But it seems to be a case in which a great zone of the country rock has been mineralized by infiltration of gold in solution. A distinguishing feature of the property, and one that marks the strike of the mineral deposition, is the existence of a north and south fissure, filled throughout by a decomposed material consisting mostly of clay and talc, but which carries no values to speak of. This, locally known as the great gouge, is traceable for several miles and is known to wave and wind considerably, while keeping the same general course. The quartzite formation through which it passes has been impregnated with gold to a varying extent. In a great open cut half way up the mountain side, on the De Lamar group, the character of this gouge is readily observed. The lower tunnel, known as No. 10, is on a level with the crushing floor of the mill and advances northward over 2000 feet. Above it are similar tunnels about 100 feet apart, almost to the summit of the mountain. From the 10th to the 5th is an electrically operated skip, used solely for a manway. A rock-walled chute passes from the higher levels to the 10th, connecting with

which all the ore is sent to the 10th level, there loaded into cars and trammed to the mill. The mine timbers are unloaded and framed at tunnel No. 5 and distributed by gravity to the stopes below.

The ore is stoped out in immense chambers, many of which are from 40 to 100 feet wide and 80 to 200 feet long, well timbered up in square sets and as the work proceeds upward the space between sets is filled with waste. Thus the work goes on from level to level and horizontally on each level, in the course of which are seen some excellent specimens of mine timbering. An illustration of the system employed is seen by the general superintendent's mine chart, on which is recorded the assay value of the ore from every block or square set on any level or stope in the mine. From forty to fifty assays are made each day from ores collected by the sampler, from which the daily record is made up.

As is generally known the mill is a cyanide reduction plant, in which the ores pass through a coarse crusher, thence through Griffin mills, of which there are thirteen in number, and by which the material is ground to from 60 to 80-mesh. It is carried by conveyors and elevators to the pulp tanks and leaching vats. The infinitesimally fine dust particles are blown into five collectors, caught in the collector stockings, from which the air escapes and the dust is thrown down to a conveyor, which carries it to the cars and thence to the leaching tanks. The dust thus saved contains a high percentage of value. The mill crushes about 300 tons of ore per day. The leaching tank capacity is 9000 tons per month and about 3200 tons of material are constantly in course of treatment through the mill. Two large vacuum tanks serve their purpose in drawing the liquid from the leaching tanks to the precipitating room, where zinc dust is used instead of zinc shavings. The equipment for reducing the auro-cyanides to bullion is quite complete, and once a month the gold bars are shipped in a burglar-proof safe to Salt Lake City.

The power plant consists of five boilers; a 500 H. P. mill engine with high and low pressure cylinders, 22 and 34-inch diameter respectively, with 48-inch stroke; a crusher engine, 14x36 inches; a 12x36-inch dynamo engine which operates a 60 K.W., 500-volt dynamo, by which the mine hoist and stationary motors are operated; besides there is a seven-drill compressor and power for a well-equipped machine shop. As a matter of economy the exhaust steam from the engines is condensed and used to heat the boiler water in a Green economizer, the latter cleansing the water and precipitating the lime and other matter in solution, the water then passing to the boilers at 190° to 200° F., where no boiler compounds are used.

A force of 150 men is employed in the mine and about sixty men at the mill and shops. The sources of the water supply are various wells and springs in Meadow Valley wash, sixteen miles east of De Lamar, where there is a pumping station. In forcing the water from the station to the mine and mill a lift of 1700 feet is made. The entire operations of mine and mill and accessories are under the general superintendence of F. P. Swindler, Wm. Oxnam being mine Supt. and Louis Gross mill Supt.

The April Fool property lies east of the DeDamar, on the same hill, its workings running almost parallel to those of the latter. The April Fool belongs to Butte parties and is in charge of Supt. J. M. Healey. In this mine is a regular vein, between well defined walls. The ores comprise a quartz, bearing considerable free gold, but otherwise quite similar to those in the De Lamar. The development here is by tunnels, which penetrate along the strike of the vein. From the upper tunnel the lowest one is a vertical distance of about 800 feet. These tunnels extend from 2000 to 3000 feet and are connected by chutes and winzes. From a point 2000 feet from the lower tunnel entrance a shaft is being sunk, a gasoline hoist being in use at the collar of shaft. The vein swells to a great width in some places and pinches in others. It dips about 10° from the vertical. A pay streak, from 1 foot to 4 feet wide, is noticeable in the gangue rock. The underground work aggregates four to five miles. In timbering the stull system is used.

The April Fool mill is equipped with Gates crusher, ten stamps, dropping ninety per minute, double discharge, with front and rear plates, effecting a saving of from 20% to 40% of the values by amalgamation. The tailings are carried by sluices to the cyanide leaching tanks, of which there are eight, with two solution tanks. About 160 tons of tailings are in course of passing through the plant. It is stated ten additional stamps are to be put in.

The Mono–April Fool No. 2, interested in which are Geo. C. Fetterman of De Lamar and Frank Knox of Salt Lake City, endlines with the April Fool proper and is in course of development, having about 1200 feet of tunnel work. The vein is said to have been encountered, showing ore that assays well.

The Gold Eagle, belonging to Nesbitt & Hing, comprises two claims, has several hundred feet of development on the vein, said to be a continuation of that of the April Fool. Recent assays showed values of over $80 gold and 200 ounces silver to the ton. The property is bonded to Sanford and others for $40,000, time limit being May 20, 1900.

The Magnolia, north of the DeLamar, has considerable of development and has made some shipments. T. R. Jones and others are interested in the group.

The Little Emma and Hunter claims, four miles north of town, belonging to Roeder, Conway & Thompson, has also been considerably developed, disclosing a fair showing of ore, carrying gold, silver, lead and copper.

The Hercules group, belonging to W. D. Maynard, is well located and has good surface showings.

The Sunbeam, a north extension of the De Lamar, is owned by Dooley, Iseman, McDonough & Docklestich and has a good showing in surface development.

The Boston & De Lamar, owned by Salt Lake parties, parallels the April Food and has a 200-foot shaft and 300 feet of drifting.

The Flagstaff group, owned by a stock company in which the De Lamar Co. have control, is developed by a 400-foot tunnel and other work.

The Monkey Wrench, two miles northwest of town, was the first location in the district. It is developed slightly, having a 100-foot shaft, uncovering native and chloride of silver and some gold.

The Reed tunnel, located near the Magnolia, has several hundred feet of work, with a fair disclosure of gold ores. The claims are owned by McDonald & Co. of San Francisco.

The Millionaire group lies west of town and parallels the De Lamar group. It is said to have ore of an average value of $18 per ton near the surface. This is patented ground and is controlled by Capt. De Lamar.

Southwest of town, on both sides of Cedar wash, are two groups of six claims each, controlled by Hiram Crowell and associates. This is about two miles from the De Lamar and April Fool workings. In the judgment of persons here, the outcroppings of the two properties named are traceable to this locality and are included in a zone 1800 feet wide. The Crowell holdings are of sufficient width to encompass the zone as apparently located. A large number of tunnels, shafts and winzes have been driven on the two groups, and it is said good value is found in a metamorphosed quartzite and in streaks of fluorspar and talc. In this locality the richest ore is next to the porphyry foot wall. The great gouge, described in the De Lamar, appears to be in evidence in the Cedar wash region.

A remarkable fact concerning the entire district is that specimens of quartzite selected at random, almost anywhere on the surface, on being assayed, show gold values to a varying degree.

Several miles southwestward is a conspicuous dry lake, the bed of which glitters with white sand and alkali. This is referred to as an evidence of the unusual aridity of this section. No heavy rains have fallen for years and the snowfall of recent winters has amounted to almost nothing. The stock ranges, as a result, support very scanty feed.

The fuel for all purposes is wood, consisting of cedar, pine and pinon from the hills and higher ranges. The supply is getting farther away all the time, most of it now being hauled from fifteen to forty miles. Most of the mine timbers are of native trees. WASCOTT.

De Lamar, March 12.

WASHOE COUNTY.

Commercial gypsum is now being shipped by the carload from the Mound House.

WHITE PINE COUNTY.

The Ely M. & M. Co. will spend $15,000 in putting in a 50-ton cyanide plant at the Robust mine. Supt. Marx expects to have it in operation Aug. 1.

OREGON.

JACKSON COUNTY.

The proposed High Line ditch is 93 miles long, and taps Rogue river to bring water to a point 400 feet perpendicularly above Gold Hill. It will be 8 feet wide at the bottom, across the top 14 feet, a depth of 6 feet, to carry 10,000 miners' inches of water for operating placer mines and irrigating down Rogue River valley. The contracts are to be let in 10-mile sections. There will be 2000 feet of fluming to be constructed on the line, where the water is to be led across small streams or along steep hillsides upon which the ditch cannot be dug. There are also 2000 feet of 31-inch iron pipe to be laid where the line crosses Trait creek, 25 miles above Gold Hill. The laying of this pipe will save the digging of over 20 miles of ditch, as the water will be carried down one hillside and up the other, where otherwise the line would have to be dug along the face of steep hills.

JOSEPHINE COUNTY.

The Eureka mine on Sailor creek, A. F. Nelson Supt., has been bonded to C. G. Griffith, Gen. Mgr. Montreal & Oregon G. M., Ltd., 52 Broadway, New York City. The reported price is $75,000. The Eureka mine is what is known as the Denver City ledge, with a face width of 30 feet, a pay streak 2 feet wide abutting against one of the walls.

UTAH.

JUAB COUNTY.

The Centennial–Eureka Co. has reduced the cost of transportation between its mine and the railroad from 80 cents to 16.5 cents per ton.

WASHINGTON.

The Britannia Copper Co. has made its final payment on the group of claims on Howe sound, near Vancouver. H. C. Walters says that a smelter will be built at Fairhaven.

WYOMING.

CARBON COUNTY.

Battle Lake is a new copper mining camp in the Sierra Madre range, 10,000 feet above sea level, in the southern part of the county, seventy miles from Fort Steele on the Union Pacific Railroad, connected therewith by a stage line. It is near the northern boundary of Routt county, Colo., and one of a series of mineral-bearing districts in the North Park region—Steamboat Springs, Hahn's Peak and Columbine basin.

FOREIGN.

BRITISH COLUMBIA.

The following are the terms of the agreement submitted by the mine owners and adopted by the Rossland Miners' Union last week by a vote of 218 to 103:

1. That the companies are prepared to open up their mines under the contract system to their full capacity as fast as circumstances will permit.

2. The contract system, putting it generally, provides that the contractors are to be paid for all the work they do, and the companies pay for all the work done, at a price agreed upon and determined by both parties.

3. The two simplest systems will be adopted, viz., (a) contract by lineal foot of hole drilled, and (b) contract by lineal foot of completed working.

4. In stopes the method of hole measurement has been selected because of its extreme simplicity, contractors not being obliged to take any chances on the breaking qualities of the ground or the powder required, the cost of mucking or loss of time from smoke.

5. Blasting will be done, except where otherwise arranged, between the hours of 1 and 7 A. M., so that the probability of loss of time will be reduced to a minimum.

6. As to having all development contracts measured by the lineal foot driven, instead of by the length of holes drilled, it is understood that most of this work will be let by the lineal foot. It would not be satisfactory to contractors or the companies to be confined to this method of measuring the quantity of work done. The method selected for any contract will vary with the mine and the existing conditions, and is a matter of free arrangement with individual contractors.

7. When, through fault of the companies, contractors find themselves obliged to do work not properly included in their contract, the time spent in doing such work, in excess of one hour, will be paid for at the standard scale of wages. When, by special agreement, contractors assume the chances of such occasional extra work the price agreed upon will be made to cover it.

8. The companies will furnish all explosives to contractors at cost from distributing stations, or they will furnish this material free of charge when agreed upon between them and the contractors in any particular work.

9. The companies will furnish all machine drills, tools and implements necessary for the work free of charge to contractors, and no charge will be made to contractors for drilling machines broken while at work.

10. The companies will arrange, as far as practicable, to have all holes in stopes blasted between the hours of 1 and 7 A. M., and they will also endeavor to have all timbering done when required so as not to interfere with the work of drilling.

11. Companies will furnish and pay for the service of engineers and pumpmen when such are required.

12. Mucking or the barring down of rock will be done by the contractors, or the companies, as may be agreed upon at the time of making contract.

13. It is expected that the prices agreed upon, based upon ordinary working conditions, will cover all delays which are inseparable from the incident to mining work.

14. It has been made clear that it is the desire and intention of the companies to afford the contractors every facility for carrying out their contracts to the end that all parties concerned may be mutually benefited.

15. The fact of an employe being a member of the union will be no bar to his employment, nor will the companies place any obstacle in the way of non-union men becoming members of a union.

16. The companies reserve to themselves the right to employ such men as they see fit, whether they are members of a union or not.

17. It is the policy and intention of the companies to treat their employes fairly and not to discharge any employe, whether he be a member of a union or not, without just and sufficient cause, it being clearly understood that membership in a union will not constitute grounds for discharge.

18. With respect to matters wherein the employes of the companies may consider themselves aggrieved the companies will, at any reasonable time, receive a presentation of the case, and consider the same in a fair and impartial spirit and endeavor to remove the cause, where any is found to exist.

19. It is expected that the union will at all times use its good offices and exhaust all conciliatory methods before permitting any strike or stopping of work; and, further, that they will not seek to interfere with the companies in employing or discharging employes or interfere with contractors.

MEXICO.

The El Oro gold mine is 100 miles northwest of the City of Mexico and consists of 174 pertenencias. There are a series of veins embraced in the company's property, the chief of which are the San Rafael and the Branch veins. The former varies from 100 to 150 feet in width, about 30 feet of which only has been worked as the pay streak. The Branch vein will average about 6 feet in width. The ore in sight in the San Rafael vein, to a depth of 225 feet, is estimated at 245,000 tons, averaging $21.88 per ton gross, and in the Branch vein 35,000 tons, averaging $35 per ton gross. The American M. Co. operated a 25-stamp mill and Chilian mill together, equal to about forty stamps, and are reported to have extracted 70,000 tons in the last five years and to have paid $940,000 in dividends, in addition to appropriating about $350,000 out of profits for the equipment of the mine and for the purchase and erection of a 100-stamp mill. This new plant is now in operation, as are also the cyanide works.

SIBERIA.

This consulate is in receipt of a number of letters by each American mail, from all parts of the United States, to the effect that a Russian engineer has recently made a report to his Government, stating that the same gold belt which has proved so rich at Cape Nome, Alaska, extends across the Bering sea into Siberia, and that there are enormously rich quartz lodes in gold mines all over Russia, which are easy to work at a great profit, are owned by the Government, and will be sold to the highest bidder. It is also stated that the Emperor has issued an ukase permitting Americans to prospect for gold on the west coast of Siberia, and that preference is given to American miners and capital to explore the mineral wealth.

These letters inquire as to the truth of these statements, for copies of Russian mining laws, and permits to prospect for gold in Russia, as numerous parties are organizing to take immediate advantage of this opportunity.

I called on N. A. Denissoff, the director of the mining department, yesterday, stated the substance of the articles, and he replied that, although the Government was taking steps to ascertain the conditions on the west coast of Siberia, the Emperor had not issued an ukase on that subject, nor was it probable that he would do so. He said that petitions might be made to the Emperor for permission to prospect for minerals in any part of Russia, which should be accompanied by recommendations as to the character of the applicant, his experience as a mining engineer, capital to be employed, etc., and it would be considered; but the best informed people here do not believe permits could be obtained to prospect for gold on the west coast of Siberia until after the Russian Government has fully investigated its conditions. Were it ready to consider such applications, the probabilities are that it would require from two to three years before the same would be finally decided. Russian officials place no value

all the intermediate levels, by means of on time, and it requires from two to twelve weeks to receive an answer to an official communication from the various departments, according to the work involved in the reply.

The value of Russian gold mines has been greatly exaggerated. Several experienced American mining engineers, who are admitted to be the best in the world, have visited Siberia in the interests of English as well as American capitalists during the past three years and made extensive examinations of the conditions, and I have not heard of a single company being organized as a result of their reports. The mining is almost all placer, there being but two small quartz mines in the Ural mountains, which are owned by French capitalists and are said to be losing money.

There is very little foreign capital in Siberia. No advantages are offered to or discriminations made in favor of Americans engaging in any kind of business in Russia.

W. R. HOLLOWAY,
Consul General.

St. Petersburg, Feb. 13, 1900.

SOUTH AFRICA.

The annual report of the Chamber of Mines of the South African republic for 1899 is necessarily incomplete in regard to most of the mines after August. The output of gold by the Witwatersrand mines amounted to 4,008,325 ounces; for outside districts, 187,635 ounces; total, 4,195,960 ounces. The returns in gold per ton of ore were: Mill, 6.41 pennyweights of fine gold; tailings, 4.07 pennyweights; slimes, 2.01 pennyweights. With the returns from concentrates and by-products, the total yield per ton of ore crushed was 10.10 pennyweights, of the value of 41s 3d, the weight being a trifle higher but the value the same as in 1898.

SPAIN.

The twenty-seventh annual report of the Rio Tinto Copper Co. for the year ending Dec. 31, 1899, shows:

	1899. Tons.	1898. Tons.
Copper produced	20,230	20,426
Copper in pyrites shipped	14,587	13,456
Totals	34,817	33,882
COPPER SALES.		
Refined copper	16,893	18,612
Copper in sulphate	1,067	981
Copper in pyrites	14,139	13,502
Totals	32,099	33,095

The average copper contents in the pyrites was 2.719%, against 2.852% in 1898 and 2.810% in 1897. The quantity of pyrites invoiced to consumers in England, Germany and the United States was 636,323 tons, against 618,110 tons in 1898, 582,540 in 1897 and 514,585 in 1896.

THE KLONDIKE.

The Canadian government has decided to sell at auction all the placer mining claims that it has reserved. Gold Commissioner Senkler says the sale will be held on June 1, 1900.

Personal.

JOHN GILLIE is the new Supt. Butte & Boston mines at Butte, Mont.

T. F. SINGISER is Gen. Mgr. Salmon River G. M. Co.'s mines, Salmon City, Idaho.

EDWARD MCKINLAY, has resigned as assayer at the Providence, Nevada Co., Cal.

W. J. CLARK, foreign Mgr. General Electric Co., sailed for England on the 9th inst.

W. S. HASKINS, Supt. Nickel Plate mine, Rossland, B. C., returns from San Francisco next week.

COL. E. D. BOYLE, an old Comstock miner, now managing Nevada county, Cal., properties, is visiting San Francisco.

M. L. VIRDEN, formerly with the Standard Con. G. M. Co. of Bodie, Cal., is foreman at the Hathaway mine, Newcastle, Placer county, Cal.

HENRY BRATNOBER is credited in Juneau, whither he returns next month, with having "cleaned up $3,000,000 in stocks while operating in the London markets during the past winter."

COL. BERNARD PEYTON has resigned the superintendency of the powder works at Santa Cruz, Cal., and, after an extended sojourn in Germany, will return to San Francisco to probably engage in a similar enterprise.

Industrial Notes.

—Over $5,000,000 will be spent by the Union Pacific in improvements in Wyoming this year.

—During '99 San Francisco imported about 1,750,000 tons of coal, of which fully 80% is consumed for steam uses, viz., 1,392,000 tons.

—Gondolas in Venice are now run by American electric motors, American bridges cross African rivers, American locomotives wake the echoes of Jerusalem and speed across Siberia.

—In Santa Clara county, Cal., the Standard Electric Co. expects to have its poles and wires from Blue Lakes to Alviso by May 20th. That point is to be the distributing point for lines running to San Francisco, Oakland and San Jose. This company proposes to transmit power 150 miles. The longest present transmission is Redlands to Los Angeles, 85 miles.

—The quantity of coal carried on the Soo canal, between Lakes Superior and Michigan, has increased from 80,815 tons in 1872 to 3,940,887 tons in 1899. Coal from the Pennsylvania and Ohio fields is supplied at low freight rates to the Lake Superior region, where coal production is light and fuel greatly in demand, as the vessels which carry the iron ore, grain and flour from the Lake Superior region carry coal on their return trips at nominal freight rates, and, as a consequence, the coal passing through the Soo canal has increased from 80,815 tons in 1872 to 3,940,887 tons in 1899. The iron ore shipments through the canal increased from 383,105 tons in 1872 to 15,328,240 tons in 1889; copper, from 14,591 tons in 1872 to 120,090 tons in 1899.

Catalogues Received.

Improved Steam Pumps, 96 pp., finely illustrated and descriptive of practical pumps for all possible service, carrying considerable condensed information to users of such apparatus. It will be sent to any address upon request by the Union Steam Pump Co., Battle Creek, Michigan.

"Fourteenth Annual Catalogue Engines and Boilers," 56 pp., handily indexed, portraying and describing engines and boilers, with colored sectional and shop drawings of setting, full flush front, one-half arch front. Sent upon application to C. O. Bartlett & Co., 43–45 Center St., Cleveland, Ohio.

Catalogue No. 13 of the Union Gas Engine Co., out this week, is fully up to its predecessors, which is saying a good deal, and gives detailed illustrated description of the "Union" marine and stationary gas and oil engines, all the illustrations being from photos of engines and boats in actual use. It will be sent on application to the Union Gas Engine Co., at their new address, 244–246 First St., San Francisco, Cal.

The Foos Gas Engine Co., Springfield, Ohio, furnish an artistic catalogue, No. 9, of their builds of high-grade gas and gasoline engines, 1½ to 250 H. P., adapted to all power purposes, which gives accurate description thereof, accompanied by unusually fine illustrations. A copy will be sent on application to the home office, or to the Pacific Coast Agency, American Manufacturers' Association, 20–22 Fremont St., San Francisco, Cal.

Books Received.

"A Practical Course in the Fire Assaying for Gold, Silver and Lead of Ores, Bullion and Metallurgical Products;" 184 pages, suitably arranged for the use of students; practical, clear and up to date; written by Ernest H. Simonds, 521 Sacramento St., San Francisco, to whom all inquires should be addressed. It is a work that could be read with profit by any assayer, mill man or metallurgist. Much of it is new, and all of it is good.

"The Gas Engine Hand-Book," by E. W. Roberts, M. E., published by the Gas Engine Publishing Co., Cincinnati, Ohio; 220 pp., 12 mo.; twenty-five chapters of gas engine practice, telling how to set up and run a gas engine, care thereof, different styles and types, the arrangement, and mechanism, formulas, testing, tables—a general compendium of information on gas engines. Illustrations and contents are mainly original, the advertising feature is absent, the idea being to give expert advice as to gas engines in general.

Commercial Paragraphs.

THE Calumet & Hecla is going to place twenty-four Wilfley tables in its stamp mills.

THE Denver, Colo., agency of the Jeffrey Manufacturing Co. is located at 543–544 Equitable Building.

HENRY E. WOOD will soon install a new Edison-Wetherell magnetic separator at his ore-testing works in Denver, Colorado.

F. A. HUNTINGTON has shipped two roller mills to the Montezuma Copper Co., Naco, Arizona, and one to Carrville, Trinity Co., Cal.

THE Link-Belt Engineering Co., Philadelphia, Pa., has closed a contract with the Lackawanna Railroad for a coal storage plant to have 100,000 tons capacity, at Scranton, Pa.

THE Rand Drill Co., New York City, has a contract for an air compressor for the Hartford mine, near Negaunee, Mich., and for compressors for the Quincy M. Co. and the Adventure Con. M. Co.

CONSOLIDATION of the American Air Power Co. of New York and the Compressed Air Motor Co. of Chicago is announced under the name of the Compressed Air Co., $8,000,000 capital, H. D. Cooke, Pres., C. H. T. Collis, Vice-Pres.

THE Sullivan Machinery Co. of Chicago has supplied fifteen machine drills to the Ibex Co., Leadville, Colo., seven to the Elkton Con. G. M. Co. at Elkton, Colo., three to the Iron Silver mine at Leadville, Colo., and to the Victor Fuel Co., for their Hastings mines, two Mitchell room and pillar electric under-cutter machines.

THE Standard M. & S. Co., Colorado City, Colo., will have the entire machinery for its chlorination mill, capacity 300 tons per day, built by the E. P. Allis Co., Milwaukee, Wis. It will be virtually a duplicate of the mill owned by the Colorado-Philadelphia Reduction Co., built by the Allis Co. at Colorado City four years ago. The new mill is expected to be ready for operation by January 1, 1901. Electric power will be used throughout.

THE Hampton zinc lathe, manufactured by the Pacific Tank Co., 35 Beale street, San Francisco, and 348 E. Second street, Los Angeles, Cal., is commended to the attention of any and all who turn out zinc shavings for precipitating gold from cyanide solution, its economy in operation making it a necessary adjunct of every cyanide plant. It is figured that the cost of furnishing 100 lbs. of zinc shavings by the Hampton zinc lathe is $129, as compared with $210, cost of operation of old style.

THE Rix Engineering & Supply Co. of San Francisco has an order from the Morning mine, Mullan, Idaho, for a 100-drill compound air compressor, to be driven by what is described as the largest tangential water wheel in the world—a Pelton wheel, about 32 feet in diameter, weighing 30,000 pounds—in the center of the main compressor shaft. On this wheel will be utilized two heads of water, operating from two nozzles, one head of water being 1320 feet and the other 1150 feet. The diameter of the wheel is a mean between the requirements for the two heads. On either side of the main water wheel are two 11-foot wheels, operating under a 140-foot pressure. The revolutions of the water wheels will be eighty—a high rim velocity for the wheel. The compressor will be of the duplex tandem type—two low-pressure cylinders and two high-pressure cylinders. All of the valve gearing on the compressor will be of the Corliss type, each valve on the machine to be operated by its independent eccentric, and thus be under independent control. The air transmission will be through about 10,000 feet of 12½-inch pipe, and from the end of this pipe, making two branches, the longer one of which will be 15,000 feet, making about five miles of transmission. The entire plant, with pipes, erected, will cost about $150,000.

CHAS. C. MOORE & CO., 32 First St., San Francisco, Cal., have recently opened an office at 313 First Ave. South, Seattle, Wash., and are making a specialty there, as well as in San Francisco and Los Angeles, of high grade steam motive power and hydraulic machinery, furnishing power plants for electric lighting and street railroad work, mills and factories. They have contract for and are now installing the 10,000 H. P. plant, complete, for the Independent Electric Light & Power Co., San Francisco, to be the largest power station west of Chicago. A 4000 H. P. McIntosh & Seymour engine was recently sold by Chas. C. Moore & Co. to the Seattle Electric Co. They are putting in the complete power plant for the Honolulu Rapid Transit & Land Co.—the new electric street railroad in Honolulu—this latter plant about 1500 H. P., compound Corliss direct connected units. They are also putting in the electric station at Santa Monica, to furnish light and power to Santa Monica, Redondo, San Pedro and Long Beach, Cal. They have contract for and will install in the Matsqui district, for the Government of the Province of British Columbia, two centrifugal pumping plants with capacity of about 30,000 gallons of water per minute each. These pumps are to be driven by Corliss condensing engines, Babcock & Wilcox boilers, with complete equipment of American-made auxiliaries. Besides the Seattle and San Francisco offices they have offices at 103 South Broadway, Los Angeles, and at Honolulu, Hawaii, U. S. A.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING APRIL 10, 1900.

647,358.—LEACHING TANK—D. W. Balch, S. F.
647,065.—THREAD GUIDE—W. H. Bartolet, Marysville, Wash.
647,364.—GAS LIGHTER—H. R. Bennett, S. F.
647,369.—PAPER HOLDER—R. G. Blower, Los Angeles, Cal.
647,372.—TRUSS—J. W. Bradford, Los Angeles, Cal.
647,218.—INDEX—C. Christiansen, Fairhaven, Wash.
647,385.—SPIKE PULLER—N. Essick, Los Angeles, Cal.
647,399.—SCREEN—Geske & Miller, Seattle, Wash.
647,226.—NAIL EXTRACTOR—G. Guinther, Covina, Cal.
647,449.—MARINE TRAM—E. W. Johnston, Seattle, Wash.
647,097.—R. R. SIGNAL—J. Jorgenson, Seattle, Wash.
647,418.—SLIDING BOLT—H. Kunz, Alameda, Cal.
647,011.—AMALGAMATOR—Malone & Terwilliger, Portland, Or.
647,451.—BEET HARVESTER—Maulhardt & Stine, Simi, Cal.
647,013.—BLACKBOARD RUBBER—J. G. Macredy, S. F.
647,152.—VEHICLE RUB IRON—E. W. Palmer, Fullerton, Cal.
647,232.—VALVE CUT OFF—W. L. Russell, Oakland, Cal.
32,499.—DESIGN—G. H. Evans, Oroville, Cal.
32,500.—DESIGN—G. H. Evans, Oroville, Cal.
32,489.—DESIGN—M. D. L. Hartley, Dehesa, Cal.
32,475.—DESIGN—J. A. Thompson, Seattle, Wash.
647,063.—GRINDING WHEEL—J. H. Adamson, W. Melbourne, Victoria.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

TIRE HEATER.—E. Beeson, Fresno, Cal. No. 646,567. Dated April 3, 1900. The object of this invention is to provide a means for heating tires which are to be afterwards applied to vehicles. It consists of a shell with outwardly and upwardly divergent conical inner surfaces upon which the tire may be laid with suitable supports, a furnace for producing the heat, a flue connecting the furnace with the apex of the shell so the heat is discharged and directed along the floor of the cone and into contact with all parts of the tire. This guide or directing device is in the form of a second cone which lies above the tire and forms an annular conical space through which the heat is directed. Above the hole is a vertically movable conical cover or cap which fits over the lower one and there are counterweights and chains passing over suitable pulleys so that this portion can be raised to place the tire and depressed after the tire is in position. The device is so arranged that

This Paper Fifty-Two Times, POST PAID, $3.00

tires of any size can be heated therein, and provides for a great economy of fuel and a rapid heating.

COOLING AND VENTILATING ATTACHMENT FOR CARS OR VESSELS.—G. A. & R. F. Dunn, Dinuba, Cal. No. 646,522. Dated April 3, 1900. This is an invention for ventilating cars, vessels and other movable structures. It comprises the outer car body or wall and an interior wall of burlap or other fibrous material interior to the main walls and forming an interspace between the outer and main and the inner or burlap wall. Suitable passages are provided with movable directing gates or valves and are made adjustable at the front end of the car so as to direct air into the space between the outer and inner walls, and screen cover openings are also made with devices by which either may be closed or opened. A tank of water situated in the upper part of the cars serves to keep the burlap wall moistened and the air which is driven into the space between the two walls by the motion of the cars is compressed and forced through this burlap wall into the interior of the car in a clean cool condition.

RAILWAY SIGNALS.—No. 647,097; April 10, 1900. John Jorgenson, San Francisco, Cal. This invention relates to a signaling device which is applicable to lines of railway wherever it is desirable to employ a signal, and particularly at the crossing of such lines. It consists of a signal including a concealing casing and a globe, one movable with relation to the other, with means for operating the signal comprising a vertically disposed solenoid, a weighted core movable into and out of the solenoid, a cord passing therefrom over a journaled drum, a corresponding cord passing over a second drum upon the same shaft connecting with the signal, so that the energizing of the solenoid will act to raise the signal and a latching device by which it is retained in its raised position after the solenoid has been de-energized.

MECHANICAL BILL-CARRYING APPARATUS.—A. W. Thierkoff, Redding, Cal. No. 646,509. Dated April 3, 1900. This invention is designed for the convenient arranging and posting of bills and the like. It consists of a desk having a hollow drum journaled and rotatable within the desk, and a sliding cover which is opened to expose the drum and closed and locked when not in use. The drum revolving within the desk thus constructed has slots made longitudinally through its periphery, and spring clamps are so mounted with relation to these slots, that a large number of bills may be conveniently carried upon the drum. The drum can be properly indexed to correspond with the ledger index, and there are openings through which the bills may be inspected or reached at will. Several bills can thus be arranged in one line depending on the length of the drum, and a number of slots will allow a large number of separate independent accounts which can be always easily reached.

Recently Declared Mining Dividends.

Vindicator Con. M. Co., Colorado, 5 cents per share, $53,250	April 25
Mary McKinney M. Co., Colorado, 6 cents per share, $60,000	April 13
Touraine G. M. Co., Colorado, 7 cents per share, $77,000	April 17
Broken Hill Proprietary, Australia, 1s per share	April 18
Mount Morgan, Australia, Gold, 7d per share, £29,166 13s 4d	April 2
Mountain Copper, California, 11s per share, making 20% for year 1899	April 10
Mount Zeehan, Tasmania, Silver Lead, 1s per share	March 28
Victoria G. M. Association, Charters Towers, Australia, 3d per share	April 7
Zeehan, Montana, 18 cents per share	March 28

San Salvador Spanish Iron Ore, 10%.

Tharsis Sulphur & Copper, 37½%.



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Write for Catalogue.
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FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

Latest Market Reports.

SAN FRANCISCO, April 19, 1900.

SILVER—Per oz., Troy: London, 27⅜d (standard ounce, 925 fine); New York, bar silver, 59½c (1000 fine); San Francisco, 59½c; Mexican dollars, 48¾c.

COPPER.—New York: Lake, 1 to 3 casks, 17.25 cash; carload lots, 17.00; Electrolytic, 1 to 3 casks, 17.00; carload lots, 16.87½; Casting, 1 to 3 casks, 17.00; carload lots, 16.75. San Francisco: 17½@18. Mill copper plates, 21½c; bars, 23½@25c.

LEAD.—New York, $4.70; St. Louis, $4.60; San Francisco 5c, carload lots, 5¼c, 1000 to 4000 lbs.; pipe 7½, sheet 8¾, bar 7c. London, Soft Spanish Lead, £16 16s 3d= 3.65c per lb.

SPELTER. — New York, $4.80; St. Louis, $4.75; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 50@55c ₱ lb.

IRON. —Pittsburg, pig, No. 2, foundry, $23, gray forge, $21.50; San Francisco, bar, per lb., 3½c.

Yesterday's Iron Trade Review reports a reduction from $2.15 to $1.90 in the price of bar iron at Mahoning valley mill and from $2.25 to $2 in steel bars at Pittsburg mills; a drop of about $2 a ton in plates or to $1.80 in Pittsburg as minimum for tank steel on large contracts; a decline in billets to $32.50 and $33 Pittsburg and a shading price of foundry iron.

STEEL.—Billets, Pittsburg, $33; sheet bars, $37; San Francisco, bar, 12c to 20c per lb.

QUICKSILVER. — New York, $52.50; London, £9 12s 6d; San Francisco, local, $52.00 ₱ flask of 76½ lbs.

PLATINUM.—San Francisco, crude, $17 ₱ oz.; New York, $18.25; manufactured, $19.50@22.00.

FERRO-TUNGSTEN.—New York, 37c, 40c; San Francisco, 75c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, $125.

MAGNESIUM.—New York, $3.00 ₱ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

TIN.—New York, pig, $31.50; San Francisco, ton lots, 34c; 1000 lbs., 34½c; 500 lbs., 35c; less, 36c; bar tin, ₱ lb, 40c.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

NICKEL.—New York, 45@50c ₱ lb.

BISMUTH.—New York, ₱ lb., $1.70 50-lb lots; San Francisco, $2.50 to $2.75 ₱ lb lots.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¼c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 12c ₱ set; 14 oz., 40s., 11c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 33@35c ₱ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 2½c ₱ lb. 66% B; soda ash, $1.60 ₱ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ₱ lb.; blue vitriol, 5½@6c ₱ lb.; borax, concentrated, 7@8c ₱ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ₱ lb.; caustic soda, in drums, 3@4c ₱ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ₱ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

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A Rich Placer proposition, adapted to working by Railroad Steam shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

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The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

San Francisco Stock Board Sales.

SAN FRANCISCO, April 19, 1900.

9:30 A. M. SESSION.

200 Andes 10c	200 H. & N.....36c
800 Belcher.....23c	500 Mexican.....34c
200 B. & B.....25c	100 Overman.....25c
500 Chollar 13c	50 Union.. .....32c
1200 C. C.& V.$1 70	500 Utah.....12c
200 Confidence..95c	100 Y Jacket...31c
200 G. & C.....26c	

2:30 P. M. SESSION.

300 Ophir.....71c	600 Sierra Nev..50c
150 Mexican.....33c	200 Bullion.....04c
200 B. & B.....25c	350 Union Con...30c
800 C. C. & V.$1 65	20 Alta 05c
300 H. & N.....36c	100 Caledonia..$1 35
200 Crown P't...19c	100 Andes.....10c
500 Y. Jacket...30c	50 Standard..$3 40
300 Belcher.....21c	

GASOLINE HOIST WANTED.
Second hand but in perfect condition. 10 H. P.
W. B. MURDOCH, 405 Montgomery St., San Francisco, Cal.

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For Sale in Lots to Suit.
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Of particular interest to HYDRAULIC OPERATORS and experienced QUARTZ PROSPECTORS.
American miners can pre-empt claims.
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BROWNLEE & LOWRY,
Civil and Hydraulic Engineers and Land Surveyors,
Atlin, British Columbia.

The Brilliant Gold Mines.
The undersigned, owner of seven gold quartz mines—from 3 to 20-foot ledges of about $8 ore; ore works by cyanide process; mines developed by five prospect shafts from 70 to 150 feet in depth; 1000 tons quartz on dumps and about 100,000 tons in sight near the surface; ten ore shoots from 200 to 400 feet in length, two of free gold, $10 per ton; 140 assays from $2 to $80 per ton; abundance of timber at the mines; water for mill plant from 7 to 10 miles below mines, in a flat; roads to said flat and all the mines; mines 90 miles distant from Candelaria, Carson & Colorado Railroad station; mines situated in southeastern part of Esmeralda county, Nevada—will give one-half interest in said mines to parties who will erect a cyanide mill plant capable of working 100 tons per twenty-four hours, also equip mines with hoisting works and extend developments 1000 feet. Selling price $190,000. Parties desiring to examine property notify A. P Anderson, proprietor Brilliant gold mines, Oriental, Esmeralda county, Nevada. Routes to reach: via Carson City, Hawthorne, Candelaria, Silver Peak, Lida, Oriental, or Big Pine, Cal., Gilbert's Ranch, Piper's Ranch, Lida, Oriental, Nevada.

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ASSAYERS AND WASTE PRODUCT SMELTERS,
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Write for Donaldson's Assayers' Slag Hammer.

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Is industrious and reliable. Can also keep books. Address Box 78, West Berkeley, Cal.

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PNEUMATIC PROSPECTOR.
SIZE, 6x 11x 14 Inches.

WEIGHT, ONLY TEN POUNDS.
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PNEUMATIC SEPARATOR.
Weight, 160 lbs.; capacity, 15 to 30 tons per day.
These machines save the gold WITHOUT THE USE OF WATER, enabling the miner to thoroughly prospect on the spot and successfully work the rich benches and gulches, when water is not convenient. The separation is accomplished by graduated air current. These machines are especially adapted for saving flour and beach gold. No quicksilver being used, the iron-coated beach gold of Cape Nome, so difficult to amalgamate, is saved with these machines as easily as though the gold was clean. Send for descriptive circulars.
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All sizes suitable for Battery Screens, Jigs, Trommels, etc.
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Brun combination furnace, gold balance, etc Very little used. Address 2119 Kittredge St., Berkeley, Cal.

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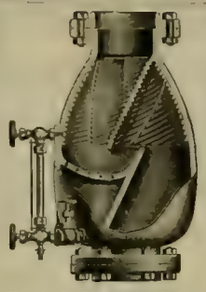
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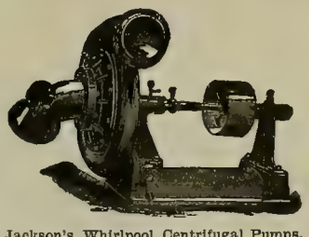
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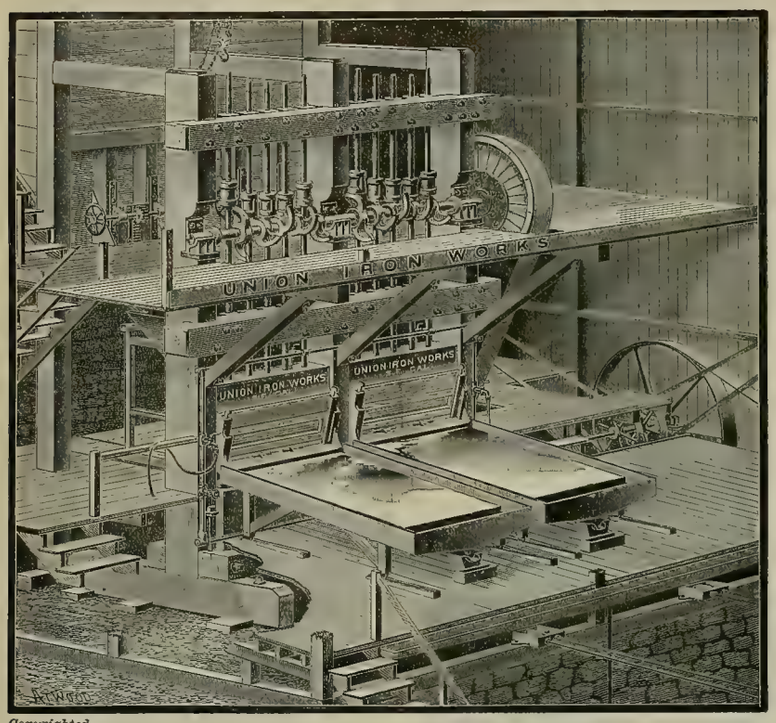
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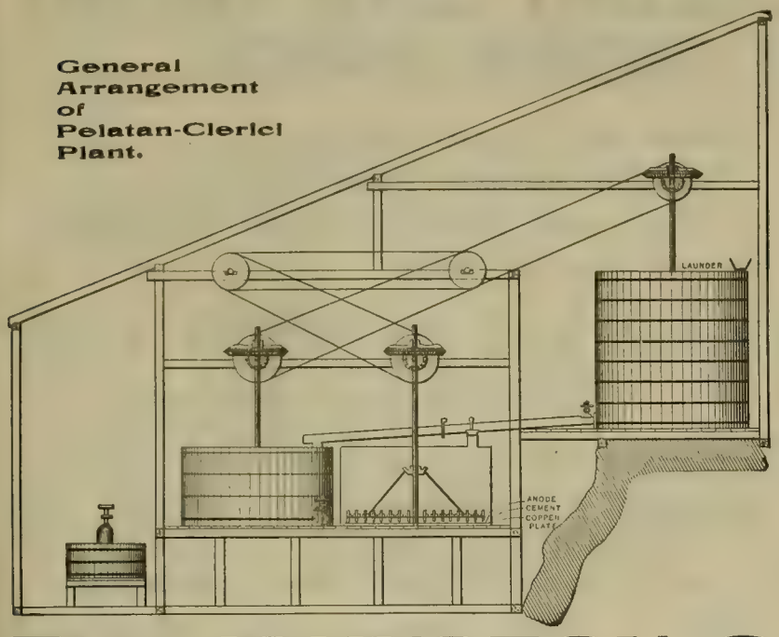
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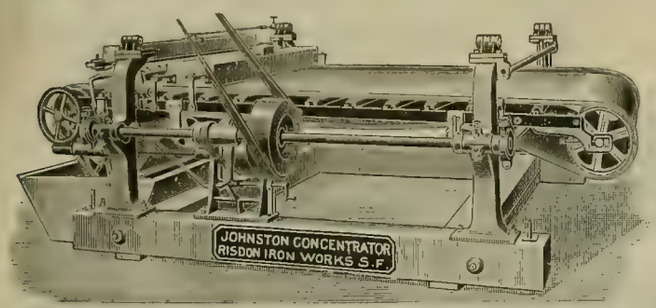
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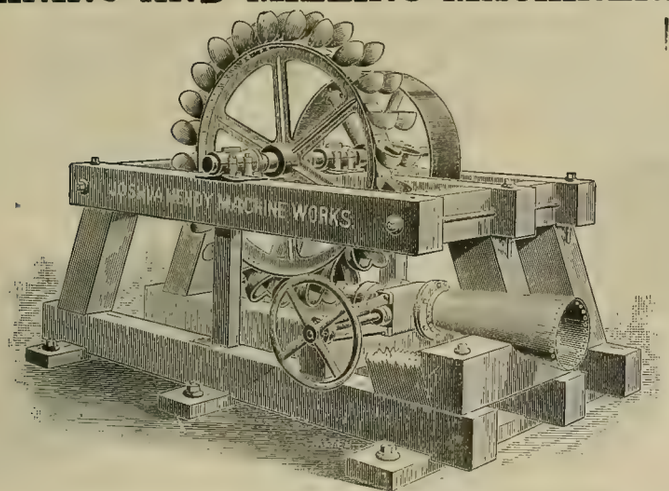
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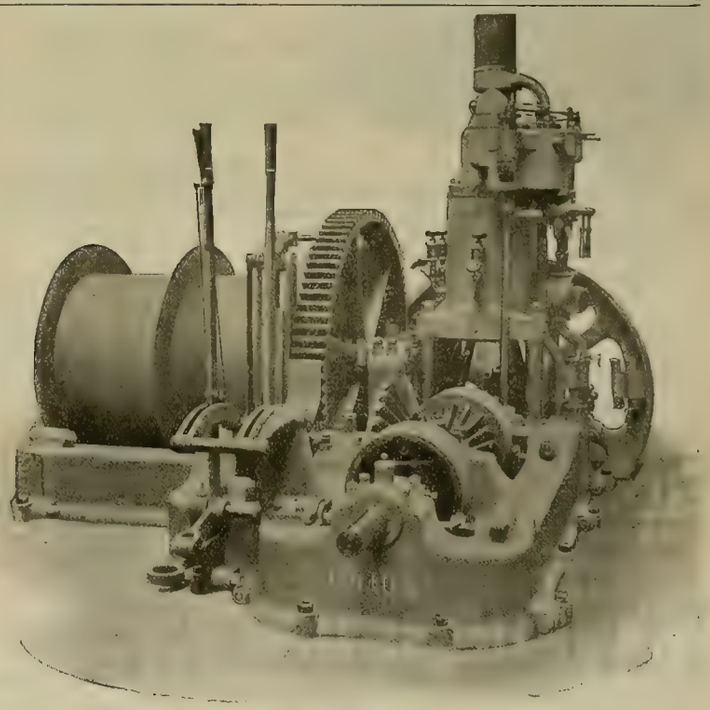
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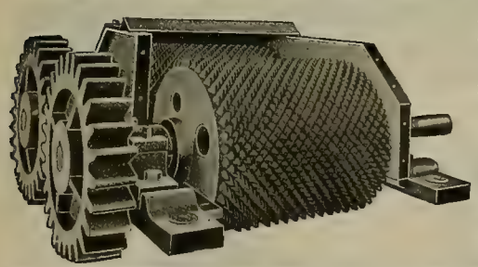
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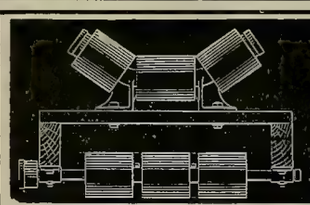
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To those who have mining machinery for sale, or who want to reach the mining world, and feel disposed to cling to the ancient notion of circulars sent by mail at random to probable or possible customers, it is suggested that they can, without doing violence to their established notions, secure better results in a better way. The following tells them how it can be done, being an illustration of how to do effective circular work at a greatly reduced cost. There are very few circulars that contain more than can be prominently displayed in one page of this paper.

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(In figuring on the cost of these circulars it is assumed that each one is sent sealed, which involves a two-cent stamp, but even were they sent unsealed they would still cost one cent apiece for postage, which would make them cost $140.) Herein we show how lovers of circulars can substitute certainty for uncertainty, and at much less cost to themselves. The force of these remarks lies in their personal application.

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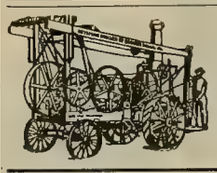
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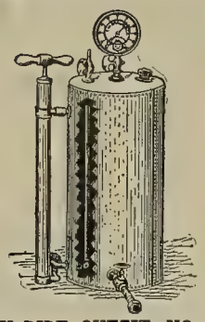
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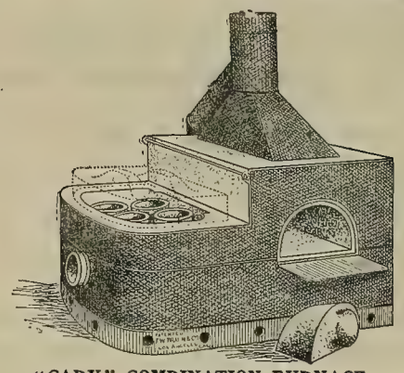
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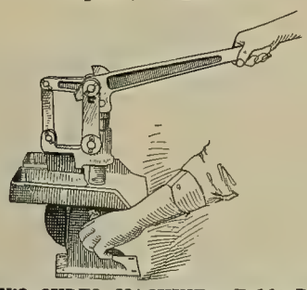
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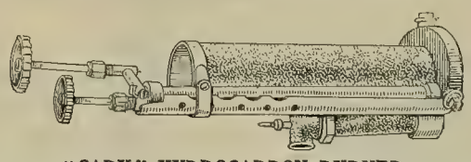
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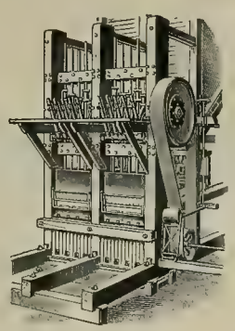
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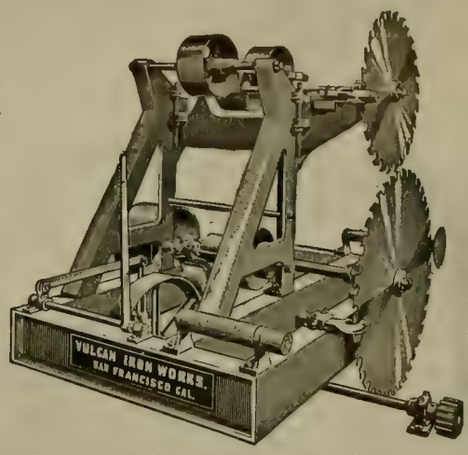
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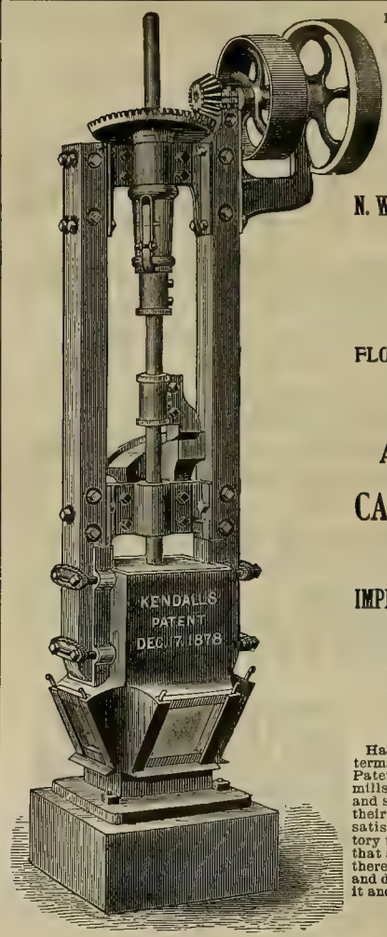
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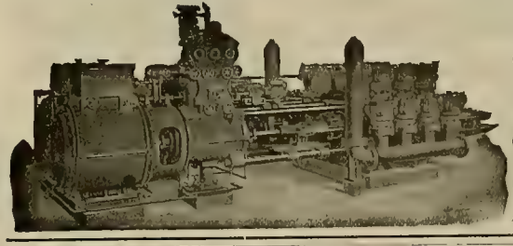
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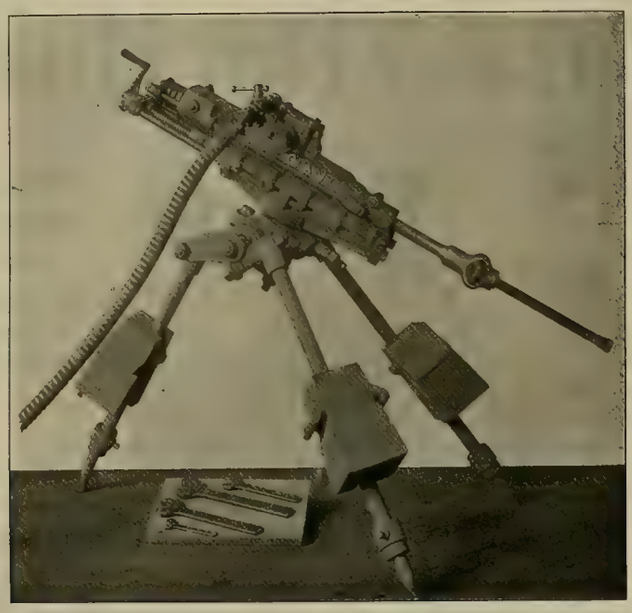
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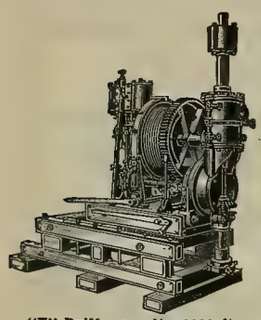
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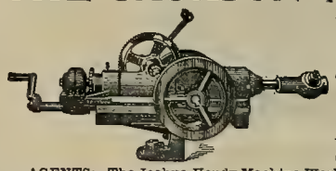
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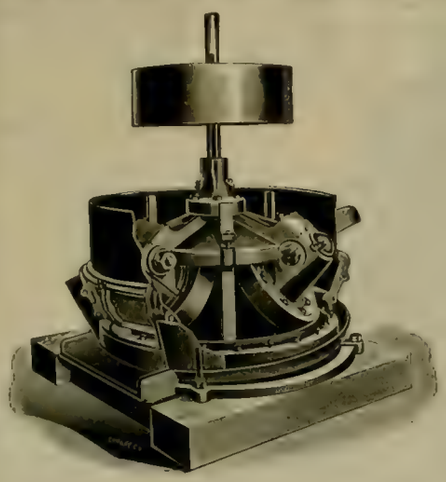
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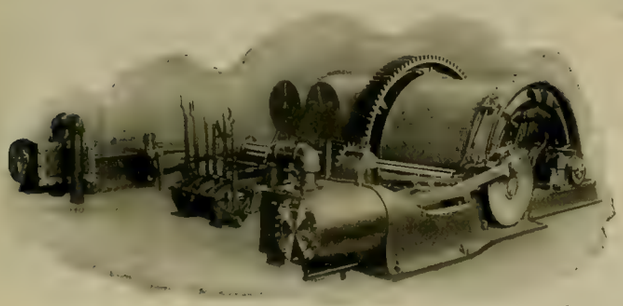
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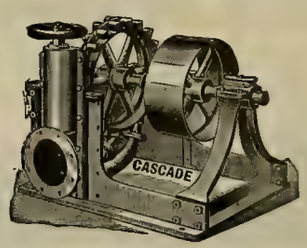
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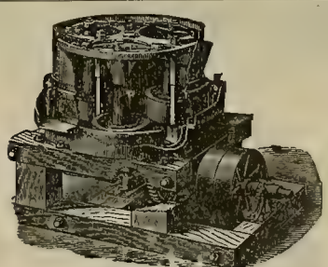
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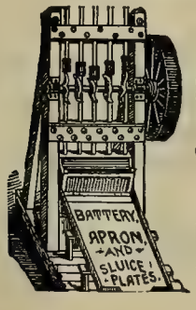
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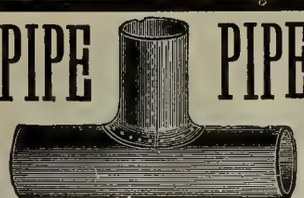
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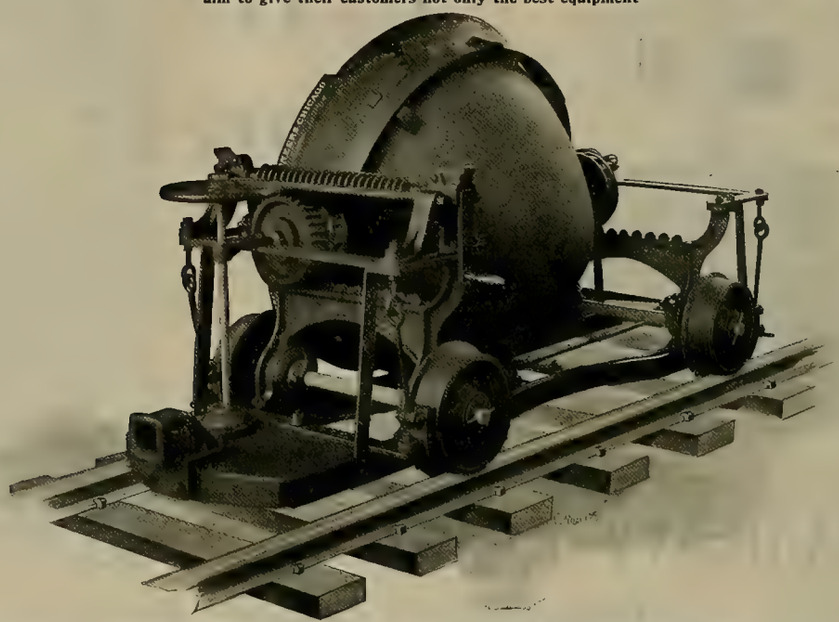
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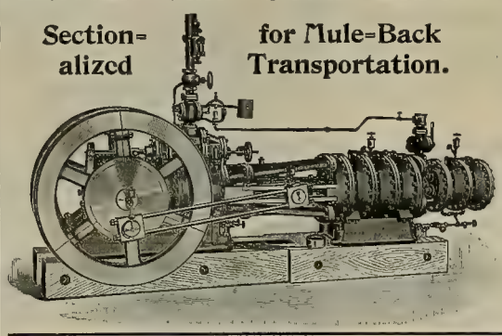
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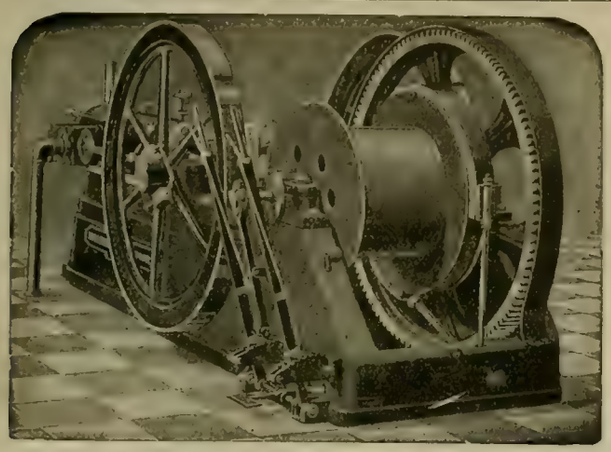
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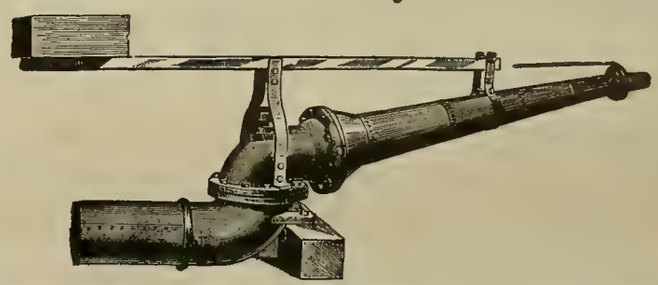
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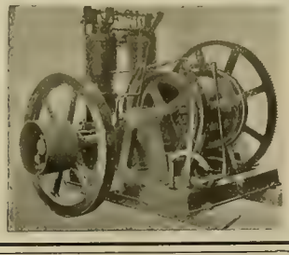
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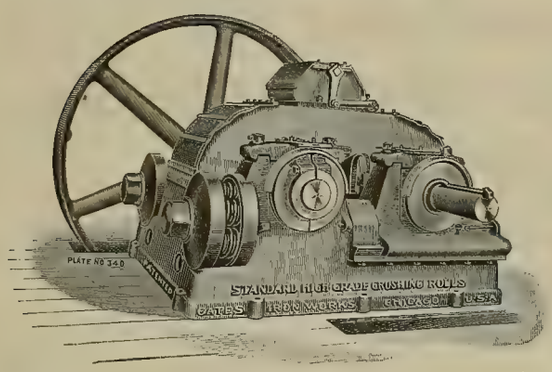
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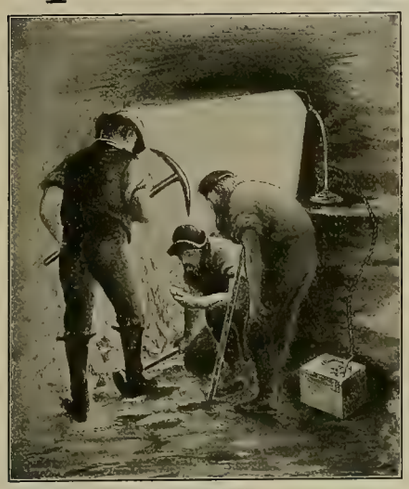
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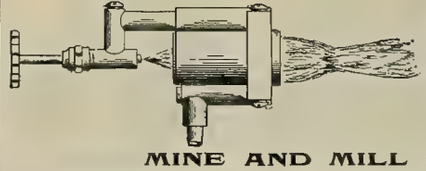
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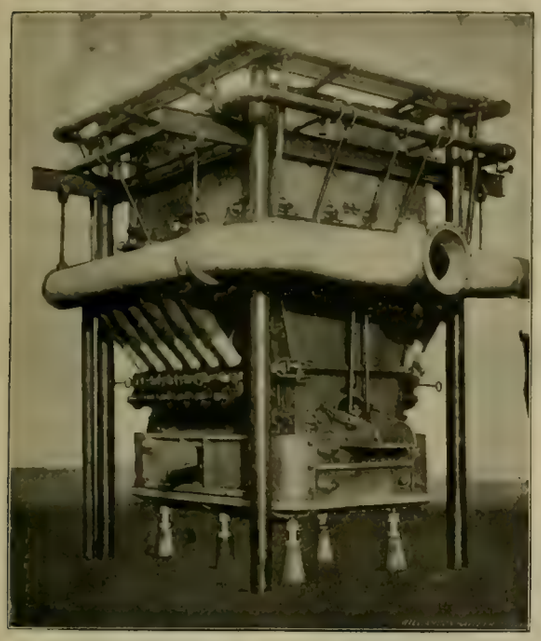
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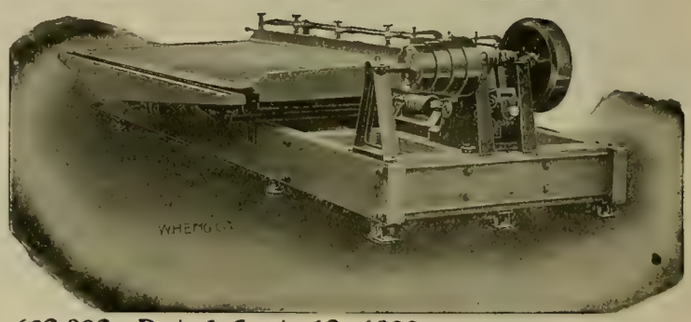
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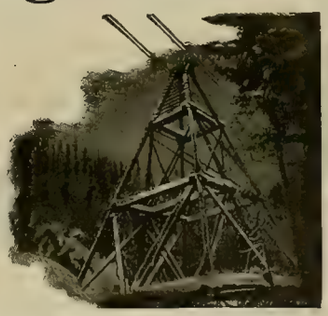
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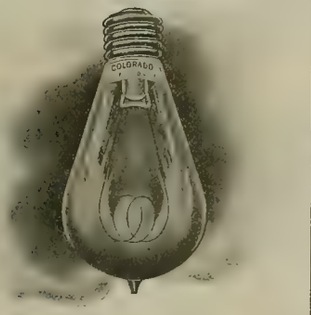
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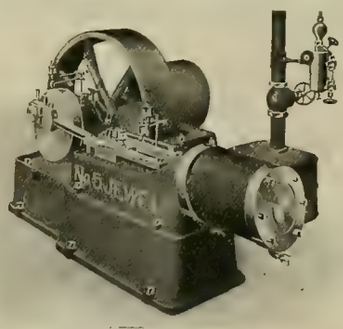
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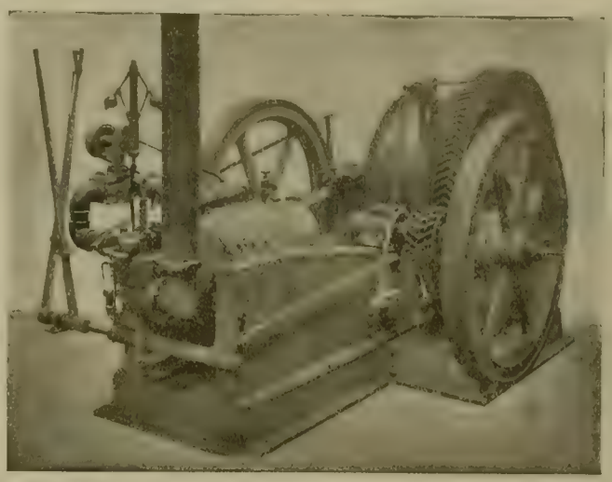
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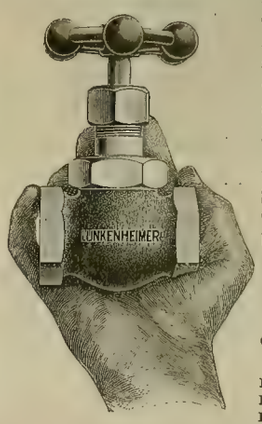
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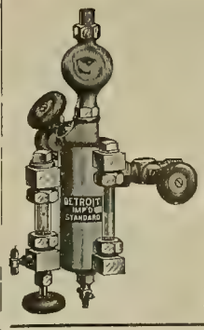


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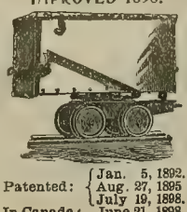
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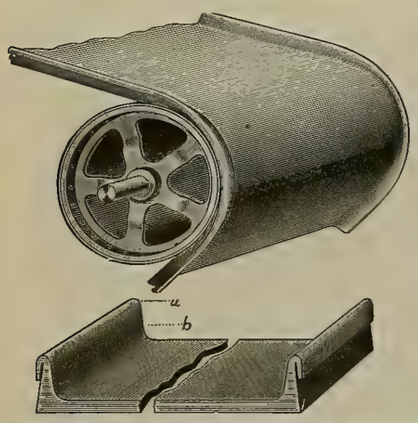
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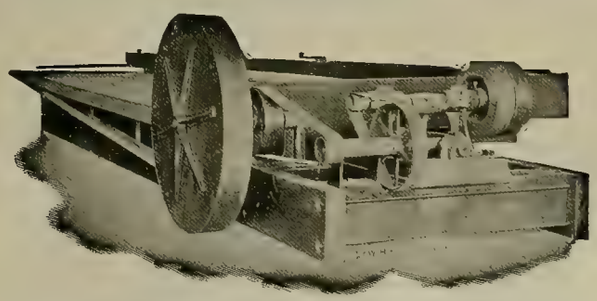
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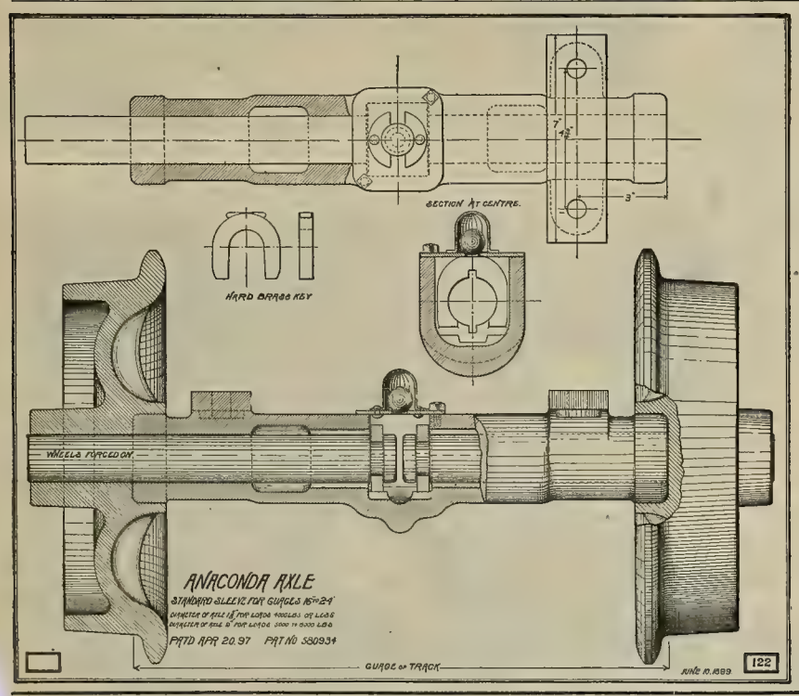
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Personal Care Necessary, Too.

Suggestion comes from Montana that this paper direct editorial attention to the necessity of safeguards and requirements by law looking to the care and protection of working miners. The idea is in order, and is in line with numerous utterances in this and other publications from time to time in that direction. The hazardous nature of mining work and the fact that in underground employment one's safety depends so largely upon the action of others makes this subject one of continued vital interest to every miner. But it is also to be observed that no amount of legal or statutory requirements will take the place of the necessary precaution required of the miner himself. The writer has seen miners do most hazardous things, and is not altogether free from memory of taking some chances himself when working underground. It would seem as though familiarity with danger makes one careless, and in connection with this subject it is in order to say that the personal equation is after all the most important. If a man won't look out for his own safety he can hardly expect others to do it for him. A large proportion of the accidents in mines is caused by carelessness or disregard of the plainest dictates of safety, and it is often the foreman or superintendent of the mine who sets an example of recklessness that is followed by equal foolhardiness on the part of his men. Of course the writer well understands that no miner in any position of importance likes to appear too cautious or timid, but, yet, it is better to be foolishly careful than carelessly foolish.

An instance will illustrate: Last week, Robert Rowland, the master mechanic at the Logan mine, Victor, Colo., went down the shaft to inspect the connecting sets. It was his place to let the engineer in charge of the hoist, or the surface man, know of the work he was going to do. This he neglected. He was standing on a dividing piece in the compartment when the cage descended on him. He hadn't time to jump, and had to catch on or fall 200 feet. The first contact of the cage caught and broke both his arms. He fell, but grabbed the guides; then the cage caught him again and tore the flesh off his legs. Then the carpenter managed to get him loose.

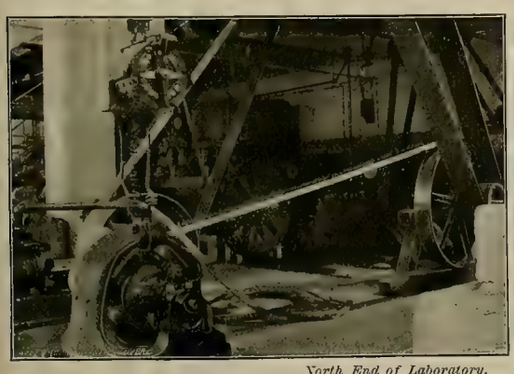
This is sufficient to illustrate the point taken. Experienced miners too often disregard the plainest requirements of safety, and even when legal enactment compels the observance of sundry regulations they have been known to disregard them. In Montana the Legislature passed a law requiring mine owners and operators to case in the shaft cages as a measure of safety to the men. In five months after the law went into effect there were six fatal accidents in the vicinity of Butte, resulting from non-compliance with the law, and the defense of the mine managers at the inquests was that "the miners preferred to ride in the old-fashioned cages," which in law was no defense at all and yet had some truth in it. In the last case noted the coroner's jury verdict was that the death of the man was "the result of his own carelessness." Of course much remains to be done to make safer the ordinary daily duties of the working miner, and everything necessary should be urged; but on the miner rests much of this duty—a duty too often ignored or disregarded.



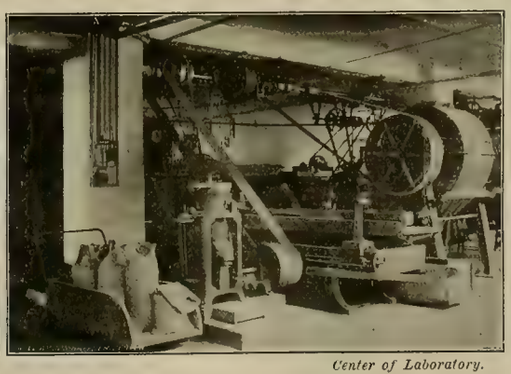
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Cyanide Plant Octave Mine, Weaver, Arizona. (See page 461.)



North End of Laboratory.



Center of Laboratory.



Rows of Medium Tanks.

Views in Metallurgical Plant, Chas. Butters & Co., Ltd., Salt Lake City, Utah. (See page 461.)

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THE secretary of the International Mining Congress asks for announcement that the third session will be held at Milwaukee, Wis., on the dates originally set—June 19–23. A large attendance is expected.

CALIFORNIA oil is now being refined and used for illuminating purposes, though the product is inferior; the process of refining includes mixture of 50% Pennsylvania oil, which has a paraffine base, as distinctive from the asphalt base of the California oil. Experiments continue with the lighter California oils in hopes to produce a smokeless illuminant, but so far without success. Chemically, the introduction of nascent hydrogen would tend to obviate the difficulty, but in a commercial sense this would not be feasible.

THE circumstances and surroundings of a mine or mining region often have more to do with its prosperity than the intrinsic value or richness of its ore. This factor enters into "mine values" and the report of a mining engineer. In one locality $30 ore may be low grade and profitless; in another more favorably situated as regards transportion, mills and main centers, $10 ore will be of value. The prominence that Colorado deservedly occupies is largely because of the admirable system of railways in that State, penetrating anywhere and everywhere that there are any indications of mineral wealth. In Colorado the railroad keeps just behind the prospector. In California, with one railroad and no competition, the one railroad ever silent to the State's mines, many a deserving locality continues too inacessible for hope of profitable working.

IN California electrical transmission enterprises, projects that a few years ago would have been deemed chimerical, are now matter-of-fact commercial accomplishments. In the southern part of the State is an electric power plant, transmitting a 33,000 voltage 85 miles. The Standard Electric Co. now proposes to transmit the electrical equivalent of 14,000 H. P. 150 miles. This company now has 500 men engaged in preliminary work, and the main features of the enterprise are worthy of special note even in these days of gigantic electrical transmission schemes. The wire to be used is of aluminum, having about 60% of the conductivity of copper, weighing one-third as much and costing less. It will be in the form of cables, twenty-seven strands of twisted wire to each cable, which will be three-fourths of an inch in diameter and will weigh one and three-fourths tons to the mile. The company furnishing the plant guarantees a delivery of 84% of the power generated. Another novel feature is the high head of water—1465 feet. A notable feature will be the use of storage batteries—the first of the contemplated magnitude in California. There will be three main trunk lines and three cables in each line. The company expects to have the entire line built and in operation this year.

Alien's Rights to Unpatented Claims.

Numerous inquiries regarding the rights of aliens to locate mining claims in the United States are received. Request is made for authoritative statement as to how matters stand in Cape Nome as to mining locations made by aliens. The matter merits notice, and in the following is exact statement of legal fact concerning this question at Cape Nome or anywhere else in U. S. territory. It answers all the questions asked as to present existing facts.

The United States mining law, in terms, confines the right of location of mineral lands to citizens of the United States, or those who have declared their intention to become such. It does not necessarily follow that the acquisition of an unpatented mining claim by an alien, either by purchase or location, is void. On the contrary, the title of an alien to such land is only voidable and while of record in the alien the land covered thereby is segregated from the public domain. A claim so held does not, ipso facto, escheat to the Government, and third parties cannot invest themselves with the right of the Government to the extent of dispossessing an alien of his holdings. The question of alienage cannot be raised collaterally, because the paramount title to the land is in the United States, and a third party has no right to complain, in a collateral proceeding, if the Government does not enforce its prerogative. This doctrine is supported by Section 910 of the United States Revised Statutes, which is as follows:

"No possessory action between persons in any court of the United States, for the recovery of any mining title, or for damages to any such title, shall be affected by the fact that the paramount title to the land in which such mines lie is in the United States, but each case shall be adjudged by the law of possession."

The question of the right of an alien to hold an unpatented mining claim must therefore be determined either in proceedings instituted by the Government, technically termed "inquest of office found," or in proceedings based upon an application for patent. In a suit adverse to such an application the question of the alienage of either party to such suit may be raised in the trial court by either of them as in right and on behalf of the Government; or, further, by the Land Department in the due course of the patent proceedings upon its own motion, or at the suggestion of a third party, who need have no direct interest in the matter.

The question being properly raised, its effect may be avoided by the naturalization of the alien at any time before judgment in judicial proceedings or final action by the department in patent proceedings, as naturalization is of a retroactive effect, so as to be deemed a waiver of all liability to forfeiture and a confirmation of title.

In other words, an alien claimant can hold as against all the world save the Government of the United States, and even as against the Government itself until divestiture of title is had in due and proper proceedings in a court of competent jurisdiction or in the Land Department. In the latter case, however, action can be taken only when it is sought to secure patent for the land, as that department has no official information of the existence of a mining claim until patent is applied for.

Hence, a mining claim located by an alien is not subject to relocation merely because of such fact; neither does the transfer of an unpatented mining claim to an alien, which was located or held by a person competent under the express terms of the mining law to appropriate or hold the same, work an abandonment of such claim; nor is the title of a qualified person to such property affected by the fact that his title was derived from an alien locator, provided that in making the location the latter complied with the statutory law and the local rules and customs necessary to make the location, and has maintained the claim by due representation thereof until the time of its transfer to the citizen.

TELEGRAPHIC ANNOUNCEMENTS of "a great strike," or that So-and-So have "refused $500,000" for their property, are to be occasionally discounted. They are frequently paid for. The fact that those items so appearing in the daily papers are marked "by telegraph", with the name of the town and the date line, is only a part of the deception. A leading advertising agency announces its ability to get "anything" published, marked "by telegraph", and having every appearance of a news item—in the daily papers—if paid enough for it. Quite often this is done, and occasionally "mining news" strays in to a daily publication that way.

A Mine Trust.

Some weeks ago a short editorial herein commented on existing conditions in gold mining that made the industry exceptionally profitable when intelligently conducted. The paragraph when copied by various publications was usually supplemented by the apt comment that the showing made was conducive to the formation of a trust in gold mining as in other lucrative pursuits. From appearances in Colorado it would seem as though such suggested trust were in actual process of formation. Recent transfers of mining properties in the Cripple Creek district indicate the gathering in of valuable properties and their consolidation in one gigantic ownership. The argument the buyers act on is that if those mines are so profitable under present forms of management they can be made manifestly more so by doing away with litigation, so prevalent between contiguous owners; by reducing the number of managers, superintendents and other officers; by building larger reduction plants in which the same economy of operation shall prevail; and, in general, by enhancement of values of stock in such mine "trust." Without direct avowal of the formation of such a "trust" or combine, every recent move in that locality indicates the virtual formation of such consolidated ownership. The situation in Cripple Creek is peculiarly favorable to such combination. At bottom the same possibilities of economical operation afforded in the smelter "trust," the steel and wire combine, or the department store, appeal to the would-be investor in the stock of such a concern. The cases are not, however, strictly parallel. Trusts can never control in the mining world. Causes and circumstances will constantly favor the individual miner and constantly create conditions that will in general inure to private ownership or separate corporate control, the tendency in that regard being to disintegrate rather than cohere. Here and there the "trust" principle may prevail. This is an era of big enterprises. Whether it be a mine or a factory, a bank or a store, the economical carrying on of the business is often rendered possible only by the aggregation of capital, and great enterprises that could not be started, much less continued, by the individual, are pushed and made permanently profitable by the combined investments of the many. But it is manifest that no trust can live long unless it secures exclusive control of the commodity dealt in; and it is equally manifest that no aggregation of capital could control the gold production of even any one region or district. So that in the domain of gold mining there is little likelihood of a "trust." Current Colorado action as regards smelter trust charges shows that that combine can not control; much less could a combine of mine owners for trust purposes. After all, the only people who have reason to fear trusts are those who trust them. Meanwhile any action that makes two producing mines where there was but one is of help all around. The consolidation of big Cripple Creek properties under one management can not be made to take on the essential attributes of a "trust;" nor can the same conditions that make trusts possible be maintained anywhere in the mining world.

A Commercial Endorsement.

The Transmississippi Commercial Congress, which met at Houston, Texas, last week, passed the following resolutions:

Resolved, That the mining industry in the United States has attained such vast proportions that it is entitled to due recognition from the national Government, and we advocate the establishment of a Department of Mines and Mining similar to the Department of Agriculture, not only as a proper recognition of existing conditions, but because of its importance to the future development of this growing industry.

Resolved, That we request of the Congress of the United States the prompt passage of Senate bill No. 3109, introduced by Senator Chauncey Depew, entitled "a bill to promote and encourage the mining, mineral and metallurgical sciences of the United States."

Concentrates.

TO RETORT foul quicksilver is the most effective way to clean it.

NO. 13, issued in 1896, was the last of the California State Mineralogist's reports.

AQUEOUS SOLUTIONS of cyanogen do not exert any solvent action on gold or silver.

NEVER run to a fight nor from it, is a fair rule regarding mining litigation and other things.

"GIANT" powder is 36 parts nitro-glycerine, 48 nitrate of potash, 8 sulphur, 8 resin or charcoal.

FROM the Con. Cal. & Virgina mine, on the Comstock, Nevada, were extracted 119 tons of gold.

THE Hendrie & Bolthoff Mfg. Co., Denver, Colo., make and supply a good powder thawer.

OIL WELLS have been drilled by electricity, notably in Indiana. The scheme is quite practicable.

THE interest of an expert affects the weight, but not the legality, of his testimony in a mining case.

AT the Golden Cross mine, Hedges, Cal., wood has been sold by weight—$4 per ton of 2000 pounds.

THERE were fifty-three issues of this paper in '98. The phenomenon will not occur again until 1910.

LAKE SUPERIOR COPPER is largely native; Western copper is reduced, electrolytically and otherwise.

DIRECT connected air compressors are in active use in various mining plants in Colorado, California and Utah.

THE highest salary paid to any Klondike examiner was $25,000, to Aug. J. Bowie by James R. Keene, for one year's engagement.

TELLURIUM occurs in isolated instances in Montana. It has been found in an oxidized form at the Mayflower mine, Madison county.

TO REDUCE a 1% cyanide solution to ¾ of 1% use three ounces solution to one ounce water; to ½ of 1%, two ounces solution to two ounces water.

THE El Plomo Co., treating free-milling ore in Costilla county, Colo., has a record of mining and milling the ore at a total cost of $1.32 per ton.

LITHIUM is the only substance with which nitrogen will directly combine at ordinary temperature. It is the lightest metal known—sp. gr. 0.59.

THE record for longest distance ever encompassed by unaided human vision is 183 miles between Uncompahgre Peak, Colorado, and Mt. Ellen, Utah.

WITH proper dredging appliance intelligently operated, gravel ground that fairly prospects 5 cents to the square yard is susceptible of profitable working.

A CORPORATION seeking patents to mining lands must comply with the corporation laws of the State where the property sought to be patented is located.

MEN who figure on those things say that, as compared with thirty years ago, 40% more gold can now be extracted from the same ore at a less cost of 40%.

A PLACER MINING CLAIM in the United States of Colombia, S. A., may cover five square kilometers. Title thereto costs about $200 Colombian money.

A DESCRIPTION of the Calumet & Hecla mine, Lake Superior, Mich., with illustrations drawn and engraved especially therefor, appeared in the issue of Nov. 13th, 1897.

IT is held by Dr. Becker and other geologists that the gold of the Rand, South Africa, is of marine placer origin, and is not the result of precipitation or impregnation.

IN Idaho, generally, the percentage of gold in the ore increases with depth; ordinarily, in Nevada, the percentage of silver in the ore is greater as greater depth is attained.

IN law a bank can not act as treasurer of a corporation, because that involves personal liability. A bank may be designated as a depositary, but its functions are commercial.

THE first census of California was in 1852. El Dorado county was first in population, 40,000; San Francisco second, 36,154; Nevada county third, 20,583; Calaveras county fourth, 20,183.

WOLFRAMITE or tungstate of iron occurs at Murray, Idaho, in scheelite parallel with a vein of gold quartz, and in the Arivaca mining district in southern Pima county, Arizona, alongside a similar formation.

AT Parnschowitz, near Rybuck, Upper Silesia, a bore hole has been sunk 6573 feet, which is believed to be the deepest of the kind. At the beginning the bore hole was 12 inches diameter; at the bottom, 2¾ inches.

"BETA" is a product such as occurs in an alloy or steel which by water-quenching at a suitable temperature has been rendered so hard that it will scratch glass, or form the edge of a tool or other cutting instrument.

THE use of vaporized mercury in amalgamation processes is not deemed advisable, because it ordinarily involves what appears to be unnecessary work and expense, and is apt to occasion salivation of the operators.

EFFORT has been made at various times to have it seem as though the California Miners' Association endorsed some publication or backed some paper, but the executive committee, which alone possesses such power, has always sensibly declined to have any "organ" or special publication represent it. Any claim to public patronage so based is fictitious.

BUSINESS should be broadly considered as a matter of principles, not solely a series of transactions. It is not a mere matter of present barter, of bargain and sale, but with a view to future conditions and greater possibilities.

POOR ROADS constitute a present great drawback to the development of a mining district, and no matter how old or how valuable, the fullest measure of profitable working cannot be compassed in any district so handicapped.

STRONTIANITE, or carbonate of strontium, is not uncommon in Oregon and California, but there is no market for it. It can be brought from Europe, if required, at less than $5 per ton. It is used for making red fire and fireworks.

CHROME ORE has long been used for furnace linings. It is not necessary that it be made into bricks. The ore may be crushed into pieces the size of a pea, mixed with tar and the furnace lined as though with mortar or cement. In use the tar burns away, leaving a solid chrome lining.

CARBONS in diamond drills cost about $16 a carat—.206 grains. Six stones of three carats are used to a bit. It costs $10 to set a bit, making a total cost of about $300. The cost per foot of drilling—except power—is about 65 cents. The diamond drill is considered a good prospecting tool for extensive work.

XYLOLITH is made at Dresden, Germany, of sawdust and magnesia, the mixture being heated to 200° Fahr. and subjected to a pressure of 2250 pounds to the square inch. It can be worked like hardwood by tools, but will not warp, burn or become damp, is made into any shape or size and used extensively for building.

SO FAR the chief form of mine swindle in 1900 is the old game of bogus companies advertising in Eastern papers bogus stock of non-existent mines, hoping to harvest from the ignorant before the inevitable expose in some mining paper. Mining is no more responsible for such swindles than any other form of business, but those swindled do not think so.

ON May 29, 1896, the President vetoed the $250,000 appropriation for California restraining dams; three days after the House passed the bill over his veto; the next day the Senate did likewise. The following winter the California Legislature made unanimous joint appropriation of $250,000 for the same purpose. The $500,000 has ever since been available. Considerable talk has gone on. Nothing definite has resulted.

APART from the intelligent zeal and energy of the Colorado miner, nothing has so aided in the development of that State's mineral resources as the railroads. Branch roads run into all the mining districts, and the discovery of a new district is the signal for a railroad extension, no matter how apparently inaccessible. It is this that makes and maintains Colorado's prominence in the mining world. Were Colorado a State of one railroad and no competition, its annual gold yield would be less than half what it is.

THE existence of fissure veins is primarily due to one or more fault planes, fissures of seams, forming ducts for the ore-bearing solutions. The ore proper, which is constituted of various sulphides with a gangue of more or less quartz, calcite, etc., occurs chiefly along these separating planes and on seams connected with them. The typical fissure vein may be regarded as a single break along which, through faulting, more or less continuous open spaces were formed and subsequently filled with ore. On both sides of this filling there is a gradually fading zone, in which more or less extensive alteration of the country rock has taken place.

REGARDING the mechanical equivalent of a 16-candle electric incandescent light, or its value in foot pounds, a foot pound per second is $\frac{1}{550}$ H. P.; a watt is $\frac{1}{746}$ H. P. A watt is therefore the smaller of the two, being only about 0.74 as large. A 3-watt 16 C. P. incandescent lamp consumes 48 watts per second, or $48 \times 0.74 = 35.5$ foot pounds per second, or $35.5 \times 60 = 2130$ foot pounds per minute. This means that 2130 pounds (a little over a ton) falling 1 foot, or one pound falling 2130 feet, would, theoretically, develop enough energy to keep such a lamp burning for one minute. Assuming 80% efficiency, it would require a weight of 2663 pounds (1⅓ tons) to drop 1 foot, or one pound to drop 2663 feet to maintain the lamp for one minute.

STEEL of superior quality is now being successfully produced by the Tropenas process at the Union Iron Works, San Francisco. The process was described and illustrated in the issues of Dec. 31, '98, and Jan. 14, '99. The Tropenas pneumatic steel process is a modification of the Bessemer process. It consists in decarbonizing pig iron, melted in the usual way, by means of air compressed under a light pressure. To accomplish this a special converter different in many points from the Bessemer and other similar apparatus is used. In brief, the Tropenas process differs from the other pneumatic processes in the following characteristics: The compressed air does not penetrate into the metallic bath, but acts only on its surface. Contrarily to all other similar processes which have in view the agitation, more or less, of the metallic bath, all the arrangements of the Tropenas process tend to keep the bath as quiet as possible during the operation. By so doing Tropenas avoids giving to the metallic bath any further agitation than the natural one caused by the chemical reaction going on in the bath. In the Bessemer operation nearly all the carbon contained in the metal is transformed into carbonic oxide, the proportion in volume reaching from 20% to 30% of the total quantity of the escaping gases, while in the Tropenas process the top row of tuyeres allows of the rational burning, above the surface of the metallic bath, of all the carbonic oxide arising from the metal, thus increasing considerably the temperature of the final steel.

THE report of the Secretary of War, U. S. Engineers, 1891, Vol. II, Part V, page 3080, says: "The total quantity of auriferous gravel remaining and available for working by hydraulic process on the Yuba and American rivers, Cal., is 1,508,875,000 cubic yards, to which is added the quantity remaining available for washing by hydraulic process on the Feather river, upper Sacramento and southern rivers tributary to the San Joaquin, Cal., 600,000,000 cubic yards, making a total quantity of 2,108,875,000 cubic yards." The value of this quantity of auriferous gravel is estimated by the U. S. Engineers and others employed by the Government for making such estimates at $552,665,000.

CARBONITE AND KYNITE are explosives used in a secondary way in British mining. Carbonite in every 100 parts of the finished explosive has 26 parts thoroughly purified nitro-glycerine, 34 parts barium nitrate and potassium nitrate, or either of them, 38 parts woodmeal, ½ a part sulphuretted benzol, ½ a part of sodium carbonate and calcium carbonate, or either of them, the whole being uniformly incorporated and of such character and consistency as not to be liable to exudation. Kynite consists in every 100 parts of the finished parts of the finished explosive of 26 parts nitro-glycerine, 35 parts barium nitrate and potassium nitrate, or either of them, 37 parts of woodmeal, ½ a part of sulphuretted benzol and ½ part of sodium carbonate and calcium carbonate.

IT is always economical and usually necessary to have considerable expert examination of the character of the ore intended to be crushed before ordering the reduction plant. A style of mill that would suit one ore might prove entirely unsuitable for another kind of ore. All the characteristics of the ore should be thoroughly and systematically studied. This will cost money, but 'tis better to spend money that way than to rush headlong into an expensive construction that may result in loss. And in this regard the mining machinery manufacturer can be of great aid in advice and experience as to determine what is best. In these days of advanced milling methods, there is little excuse for the failure of a properly provided milling plant if sufficient ore can be furnished.

FIGURING on the loss in sulphurets, in an attempt to locate it, one can pass a 10,000-grain sample through a 60-mesh wire screen; weigh what passes through and what remains; carefully pan each lot by itself from one pan into another just as long as the sulphurets show: each batch to be then accurately weighed, separately. If pulp samples are used instead of tailings the amount of sulphurets in the ore can be determined. Say the sulphurets assay $80 per ton, and the quantity per ton is 1.8%, the value of the sulphurets in one ton of the ore would be 75×0.018, or $1.35 per ton. Should the loss of sulphurets in the tailings be shown to be 15 grains out of the 10,000-grain sample, and the value of the sulphurets $75 per ton, then 75×0.0015 would give the value of the sulphurets in the tailings at $0.1125 per ton of tailings.

THERE is no grant from the Government, under the Act of Congress, unless there is a location according to law and the local rules and regulations. Such mining location is a condition precedent to the grant. Mere possession, not based upon a valid location, would not prevent a valid location under the law. The Supreme Court of the United States affirms this and says: "The right to the possession comes only from a valid location. Consequently, if there is no location, there can be no possession under it. Location does not necessarily follow from possession, but possession from location. A location is not made by taking possession alone, but by working on the ground, recording and doing whatever else is required for the purpose by the Acts of Congress and the local laws and regulations."

IN a new method of preparing white lead a basic lead acetate solution, containing 11% of basic salt, is treated with carbonic acid at a temperature of 120° Fahr. while flowing in thin layers over a series of shelves. An essential point is that the process must be stopped when one-half of the basic lead salt has been converted to white lead. The product contains from 30% to 37% of hydrated lead oxide, and is amorphous. To stir finely powdered litharge into a solution of normal lead acetate would cause the mixture to crystallize. By exposing the crystals to carbonic acid gas a basic carbonate is formed, while neutral lead acetate remains in solution. A solution containing 14% of normal acetate is treated with fourteen pounds of litharge to each cubic foot of the solution. Coarsely powdered litharge is used at first, but the final additions are made with litharge that has been passed through bolting cloth of 200 meshes to the square inch. The process is carried out with a steam-jacketed copper vessel provided with a stirring apparatus. After eight minutes the mass becomes curdy, and then a stream of carbonic acid gas is passed into the vessel. The crystals melt and are in part converted into white lead, which is separated from the lead acetate solution by the use of a filter press.

Copper From the Ore to Wire Bar.

Condensed from a recent address by A. R. LEDOUX.

The production of copper in America from 1845 to 1890 amounted in round numbers to 1,000,000 tons. Prior to 1880 Lake Superior produced nearly the whole quantity, but from 1880 to 1890 Montana and Arizona began to compete with the Lake region, and the figures for that decade are: Lake Superior 45%, Montana 36%, Arizona 15%, elsewhere 4%.

In 1890 Montana passed its rival, the figures for that year being: Lake Superior 38%, Montana 43%.

The following table shows the increase in production in the last five years. It is stated in pounds and in round numbers:

LAKE.

1895.	1896.	1897.	1898.	1899.
129,000,000	143,000,000	145,000,000	158,000,000	155,000,000

MONTANA.

1895.	1896.	1897.	1898.	1899.
190,000,000	232,000,000	237,000,000	216,000,000	239,000,000

ARIZONA.

1895.	1896.	1897.	1898.	1899.
47,000,000	72,000,000	81,000,000	111,000,000	122,000,000

Broadly speaking, the metallic mines are confined to Lake Superior, the sulphide ores have received their greatest development in Montana, and the oxide ores are characteristic of Arizona.

The Lake Superior ores carry the copper in an almost chemically pure form. The metal is disseminated through lavas, sandstones and conglomerates, sometimes in masses, but usually in tiny specks—the average assay of the district being less than 4% of copper, but the distribution is uniform and the average sure.

The Calumet & Hecla has paid its shareholders over $66,000,000 since 1871, and has produced nearly 1,500,000,000 pounds of copper. The ore is raised from twelve shafts, one of them over four-fifths of a mile in vertical depth. Five thousand tons are hoisted daily an average distance of 3000 feet. The cost of Calumet copper laid down in New York in the form of wire bars or ingots probably does not exceed 6 cents per pound.

In the Tamarack, another Lake mine, the deepest shaft is 4600 feet, and will soon reach a mile in vertical distance from the surface.

The Lake Superior ore admits of simple treatment. It is pulverized in steam stamps, each handling hundreds of tons in a day. When pulverized and automatically screened and separated into several grades of fineness it passes to jigs and concentrating tables or buddles. A jig is practically a sieve plunged up and down in water. The lecturer illustrated this by supposing a flour sieve to contain a mixture of white sand and shot of substantially the same size. If the sieve were forced up and down in water the ascending current would finally bring all the lighter sand to the surface, leaving the heavier shot on the bottom. If the mixture flowed into the sieve continuously, the light sand would overflow the side of the sieve with the water, and by and by the shot would all be collected on the bottom, whence it could be continuously or intermittently removed. The finest ore in size goes to tables over which a stream of water flows—the lighter and worthless gangue being washed away, while the heavier metal remaining upon the table is caught or diverted into another direction. While the ore of the Calumet probably averages 4% copper, there are other paying mines that have phenomenal records of economic working. Among these is the Atlantic. In 1898 it produced 4,500,000 pounds of copper, yielding the company 11.83 cents per pound. The average of the ore was about six-tenths of 1%, or a value of $1.40 per ton of ore raised; mining costs 90 cents, transportation 5 cents and milling 24 cents. The total operating expenses, including freight and commissions, were $1.3481 per ton. The copper, therefore, cost 9 cents a pound, giving a net profit of nearly 3 cents. This record is not equaled in any other copper mine.

The so-called mountain system of veins is characteristic of the Rocky mountains and Sierra Nevadas, and receive their greatest development in the vicinity of Butte, Mont., as far as sulphide ores are concerned. The Butte mines are complex. There is no "bed" corresponding to the Calumet conglomerates, but sulphides are interspersed in bunches or otherwise through altered granites. The Butte district is seven miles by four in extent, but the mines that have made Butte famous underlie an area of about 3000 by 7000 feet. The Butte mines—many of them—were started as silver propositions, the altered surface ores being rich in that metal. As depth increased rich ores grew somewhat more scarce, but at the depth of (to-day) from 1500 to 2000 feet the grade is quite uniform—in the neighborhood of 6% copper is the average of the camp. In the early days the Butte mines used to ship ore to sampling works in New York which contained over 50% copper. All the Butte ores contain gold and silver as well as copper. The Anaconda has produced 1,000,000,000 pounds of copper, 50,000,000 ounces of silver and 150,000 ounces of gold. This copper mine is the largest silver producer in the world. From 3000 to 6000 tons of ore are daily mined from the Anaconda. The Anaconda supports the surface by the introduction of a forest of 60,000,000 feet of lumber yearly. The ore is carried twenty-seven miles to the metallurgical works which reduce it. The difference in the treatment as compared with the Lake Superior is due to the fact that in the first case they have only metallic copper to separate, refine and remelt into wire bars or ingots, while the sulphide ores contain a larger proportion of impurties than Lake copper, the principal impurities being sulphur and iron, although arsenic, antimony, bismuth and other undesirable substances, including tellurium, are usually present. The metallurgy of the Butte copper ore, therefore, consists of several stages: First, the concentration to separate the sulphides from the granite or other gangue; second, roasting to get rid of the greater part of the sulphur with its accompanying volatile impurities; third, the smelting of the roasted sulphides to form matte; fourth, the so-called bessemerizing of the matte to produce impure copper, and finally the refining of this impure copper. The ore arriving at the Anaconda works is discharged from the cars at the highest point, the works being situated on a side-hill; it passes through crushers which break it up small enough to go into the steam stamp mills, from which, being automatically separated into various grades of fineness or size, it passes to jigs similar to those employed at Lake Superior, which separate the ore from the gangue and deliver the concentrated ore at the roasting furnaces. Some of the very fine ore is treated separately on tables. The ore is roasted in several mechanical roasting furnaces of different make and principle. In the early days of copper smelting the sulphides were usually roasted in heaps on the ground, and sometimes in so-called stalls, but in the most modern plants the roasting is performed in mechanical furnaces.

These and nearly all concentrating works are as nearly automatic as possible. The ore descends by gravity from the cars through the crushers and other apparatus to the lowest level of the works and is carried from place to place by streams of water. Even the ashes from the roasting and smelting furnaces are continuously carried away by a current of water flowing through the ash bed, and they are discharged at a long distance from the works without the intervention of any hand or tool.

There are two types of roasting furnaces at Anaconda. The Bruckner furnace is a cylinder some 20 feet in length by 10 feet in diameter, lined with brick and revolving slowly. The unroasted ore goes in at one end and is discharged at the other while the gases from the burning sulphur go up the stack. Each furnace handles about 18,000 pounds of concentrates in a day, reducing the sulphur from 40% to 10%, which is a most favorable proportion for subsequent operations. It takes about one ton of coal a day to fire each furnace, the coal available in Montana being much inferior to Eastern coals. It also takes the labor of two men per day of twenty-four hours to handle the material passing through one furnace. Another type employed at the Anaconda is the Wethy furnace, which consists of three or four horizontal shelves, one above the other; at the end of each shelf, but alternating in their position, are holes through which the ore can drop from the upper to the lower level. An endless chain carries a rake along the upper shelf, dragging the burning ore toward the opening, through which it drops to the second shelf. The chain comes out at the end of the furnace over a sprocket wheel, re-enters the second shelf, dragging the ore in the opposite direction, hence it falls to the third; then the chain, still traveling onward over a second sprocket, drags the same along the bottom shelf, from which it drops into the car ready to receive it, more or less prepared for the subsequent operations.

The next step is the matting of the roasted ore. It is fed into an upright furnace of the cupola type, which is surrounded by a water jacket to keep it cool. Coke or limestone or other necessary fluxes are added and a blast of air introduced. Under the effect of the blast and of the heat evolved the ore melts. The impurities are largely slagged off, this slag carrying iron, silica, lime, etc., and the sulphide of copper is concentrated still further into a matte, which runs about 30% of copper, or can be brought up to 45% or 50%, or even higher if desirable. At this point begins the bessemerizing of the copper, which is the most important of recent discoveries in the metallurgy of this metal. The well-known Bessemer furnace, which has been used for many years in converting iron into steel, is now universally employed for taking advantage of the oxygen of the air in removing the 30% to 40% of sulphur which the matte contains. The Bessemer furnace is of various kinds, being the ordinary pear-shape converter with which the steel industry has made us familiar, or a simple trough. In the bottom of the converter air tubes are introduced; the molten matte is run in from the furnace and the blast turned on; the sulphur combining with the oxygen is discharged as a gas—the remainder being brought to a purity of from 96% to over 98% of copper. Of course, this copper carries with it the gold and silver which were originally present in the ore. The converter is discharged when the reaction has ceased, and the copper produced is cast into pigs, or converter bars, as they are called. The converters are lined with various mixtures in order that the substance of the lining may unite with some of the impurities in the copper that are not volatile, and, forming a slag, be easily carried off.

The next step at Anaconda and elsewhere where converter copper is produced, carrying precious metals, is the electrolytic separation of the metals.

The ores of Arizona and of the southwest in general are of the carbonate or oxide type as far as the surface ores are concerned, remembering, of course, that only general terms are being used, and that in every district as well as in every mine there are more or less of all types of ore. In Arizona there has never been any glacial erosion which has removed the oxidized ores with all the decomposed rocks of the surface in our northeastern States and in many parts of the Rocky mountain range. These oxidized ores always overlie sulphides when they have not been artificially removed. As a type of the carbonate and oxide mines of the Southwest, the Copper Queen is worthy of attention. This mine was opened in 1880, and a small furnace operated on its ores that year. To-day it has become one of the largest mines in the world, with some 20 miles of shafts, tunnels, galleries and levels, and ore in sight capable of yielding 3,000,000 pounds of copper per month for many years. The occurrence of the Copper Queen's and similar ores is in limestone, and in this rock they are deposited in eccentric and curious ways. Bodies of ores are come upon without the slightest indication of warning, and equally without warning they suddenly disappear. From barren rock, showing no trace of copper, a drill will sometimes enter a cave of great extent, the sides and walls being magnificent with blue, red and green copper stalactites, and underneath large bodies perhaps containing thousands of tons of rich ore. In the Copper Queen there are to-day cubes of ore blocked out on all sides that exceed 400 feet on the edge. Up to 1884 this mine produced 20,000,000 pounds of copper from a body of ore which was then exhausted. Another bonanza was discovered, from which the mine is still taking out millions of pounds of copper a month, and with no indication of immediate exhaustion. The surface ores of these carbonate mines could be smelted without bessemerizing or roasting, producing in the furnace by one operation black copper equivalent to the converter bars and suitable for the electrolytic separation, but, with depth, sulphides came in, and now the Copper Queen also is bessemerizing mattes and producing converter bars which go East for their electrolytic refining. The metallurgical works of the Copper Queen are most thoroughly modern in every respect. They use the trough converters previously mentioned, holding about 30 hundredweight of matte which assays 33% copper. These converters are 8 feet long by 6 feet in diameter.

The final stage of copper refining is the electrolytic. Till recently all the electrolytic establishments of the country could in a sense be considered experimental, but works erected in 1899 were probably the most perfect that could be devised for some years to come. The lecturer deplored the extreme jealousy and consequent secrecy which existed in some works, preventing the men in charge exchanging with one another improvements and variations in the method for the common good of all. He stated that in the application of this process, as he had observed it in visiting various works, the differences were comparatively slight. Some used wooden vats and some slate, some prefer the arrangement in series, some in multiple arc. Some companies thought best to increase capacity by enlarging the number of tanks, thus adding to their permanent investment; others increased their permanent expense by increasing the power in a fewer number of tanks. He stated that the chief difficulty was the maintenance of a constant-current density, and quoted Dr. Keller's statement that he did not believe a current density of over 18 amperes per square foot had ever been successfully exceeded for any length of time in the United States, and that the average density did not exceed 12 to 15 amperes per square foot. He discussed briefly the relative merits of the Hayden and other systems employed at different works, stating that the chief difference was in the form of the anode. In most works operating under Hayden's patent the anodes were rolled into sheets, although in one of the works in England they had successfully cast their anodes into plates not over ¾-inch thick. He spoke of different modes of hanging the anode which were practiced, stating that the Hayden system economized space, as the anodes could be set more closely, thus admitting also of greater current density and a more rapid turning of the copper, the result being to decrease the amount of metal tied up in the tanks.

The cost of the electrolytic operation at Anaconda is stated to be three-fourths of a cent per pound of copper. In Eastern refineries, however, contracts have been made by which the refiner agrees to return to the miner all the copper, gold and silver the assay certificates call for in the form of refined copper, gold and silver. Charges for his services in some cases are so much less than 1% per pound that it is evident that it does not cost the Eastern refiner as much as three-quarters of a cent, even including interest on money tied up in the metals in the vats.

The Theory of the Wiring Table.

By THOMAS G. GRIER.

Wires are used to form an easy and direct path for the distribution of the electric current, as pipes are used for distributing gas or water to places at a distance from the source of supply. The sizes of pipes are determined upon the basis of the distance and the quantity of material sent through them. Wires, as well, must have some distinct size depending upon the circumstance governing different conditions. It is necessary to make calculations in order to ascertain the size of wire, and to shorten and to simplify this work of calculation wiring tables have been compiled.

A wiring table gives at once the result in the commercial size of wire; and when the proper table is at hand, no multiplying or dividing, no figuring, no application of a formula is required.

In all substances there exists some unknown obstruction to the flow of an electric current. The technical name given to this obstruction to the passage of an electric current is resistance. It is not known what causes this resistance, but by experiment the extent to which it exists in any substance can be ascertained and measured. It is known how in any substance the amount of resistance may be varied by altering the dimensions, also as to the amount of energy necessary to overcome any resistance.

The theory of the wiring table is simply one of proportioning resistances. The first point to be considered is how is the resistance varied in any substance. The law states that the resistance of any substance varies directly as its length and inversely as its cross-section. This law has been verified by experiment and is universally accepted as a law of nature.

The resistance varies directly as the length of any given substance means that, if the length of a wire is doubled, the resistance is doubled, and three times the length means three times as much resistance. The resistance varies inversely as the area of cross-section means that, if the area of a wire is doubled—that is, if there is just twice as much metal for a given length of wire—the resistance is decreased one-half; if the area is increased three times, the resistance is decreased to one-third.

In a wire of a given substance, if the length is doubled and at the same time the area is doubled, the resistance remains the same; or if the length is increased to three times as great, and at the same time the area is increased three times, the resistance remains the same.

From this application of the law already referred to it can be seen how it is possible to vary the size of a wire so that the resistance remains constant for any length, or how the resistance may be changed to suit any condition or circumstance.

The next consideration is the action of the electric current. The pressure is measured in volts, and the rate of flow is measured in amperes. The volts are all used up in forcing the amperes against the resistance. The resistance (if it were all in the wire) would mean a total loss of the electrical energy, because the volts would be used in doing work from which no results were obtained.

It is necessary, therefore, to make the resistance of the wire which conducts the current but a proportion of the total resistance, the rest of the resistance of a circuit being that which exists in the lamps and the other devices or apparatus which convert the electrical energy into commercial forms as light, power or heat.

To so compile a table and calculate the sizes it is necessary to consider the relation which exists between the unit of resistance—the ohm—the unit of pressure—the volt—and the unit of current—the ampere.

One ohm resistance requires the pressure of one volt to transmit one ampere; two ohms require two volts to transmit one ampere. One volt will transmit but one-half an ampere over two ohms, and 100 volts will transmit 10 amperes over 10 ohms. This is Ohm's law, which, when given in the form usually found in text books, is as follows: The rate of flow or current, measured in amperes, is equal to the volts divided by the ohms. The volts are equal to the amperes multiplied by the ohms, and the ohms are equal to the volts divided by the current flow or amperes.

Knowing the relation of resistance to the flow of currents and to the pressure, the next point to be considered is the substance used for the wires and ascertain the amount of its resistance for a given length and size, to be used as a unit for making the calculation necessary in compiling the table.

Copper, commercially and physically, represents the best conductor for the transmission of the electric current. A dollar's worth of copper will conduct a greater amount of electric current than any other metal of equal value with the same loss of energy.

In the illustrations following, copper will be the substance considered, as the wiring tables used for ascertaining the size of wire are for copper wire. The units by which wire is measured are the circular mil and the foot. The circular mil is the area of a circle whose diameter is one one-thousandth of an inch. The foot is a unit familiar to all.

The unit of wire then would be a wire one foot long, the area of which is one circular mil, and the resistance of this unit of copper wire is between 10 and 11 ohms, depending upon the temperature of the wire; 10.6 ohms may be assumed as the resistance which approximates closely to the average at ordinary temperatures. Taking this as the basis for compiling a wiring table, it is known that to send an ampere through this unit of wire would require 10.6 volts, for, as stated in Ohm's law, the volts must equal the ohms multiplied by the amperes. In everyday problems the known quantities are the volts and amperes, and the calculation is to find wires of proper resistance to suit the conditions.

The resistance, or the ohms, must equal the volts divided by the amperes. To solve this problem the volts are divided by the amperes, and we have the resistance, which varies as the length and inversely as the area. It is the area of a wire which is desired, and one the resistance of which will equal the resistance found by dividing the volts by the amperes. The resistance of one foot of copper wire, one circular mil in area, equals 10.6 ohms.

The resistance of any wire is equal to its length multiplied by 10.6 and this divided by the area. Now it is known that the volts divided by the amperes equal the resistance, and the volts divided by the amperes are, therefore, equal to the length of the wire multiplied by 10.6 and divided by the area.

In any problem of wiring we have the number of volts and amperes, also the distance the current is to be transmitted, and the only thing remaining to be found is the area. To find this, we multiply 10.6 by twice the distance, or the total length of wire (in multiple arc work there is one outgoing wire and the return circuit, which makes the total length of wire double the distance), and multiply this by the amperes and divide the product by the volts used, which gives the area of the wire.

The volts used are not the total volts of the system, but the volts lost in the wire. If the problem is given so many per cent loss, it would mean a per cent of the total number of volts. To illustrate: If the wire is to use up 2% of the pressure, and the voltage of the system was 50, then you would divide by 2% of 50, or one volt; or, if the pressure was 100 volts, you would divide by 2% of 100, or two volts.

In compiling a table, let it be assumed for a fifty-volt system for a regular increase of distances of 10 feet, the following method is pursued: First, the per cent loss is ascertained, let it be 2%. This, then, would be one volt. Then one ampere will be considered, first, as the total current flow, and the following calculations would be made: 10.6 would be multiplied by 10 feet and by two to get the length of the wire, and this multiplied by one ampere and the product divided by volts lost, or, in this case, by one, which would give us an area of 212 circular mils. This would be the size of a wire necessary to allow one ampere to be transmitted 10 feet with one volt loss, or 2% of fifty volts.

The next calculation would be for 20 feet distance, and, as the resistance of the wire must remain the same, the area first found, namely, 212 circular mils, must be doubled as the distance has been doubled. For 30 feet to keep the resistance constant, the area is increased three times, and so on until the limit of the table—say 200 feet—is reached, when the area will be increased twenty times, as the length has been increased by that amount.

Then the same method will be continued for two amperes, namely, multiplying by 10.6 by the distance and by 2 to get the length of wire, and this multiplied by amperes and the whole divided by the volts lost. This is continued until the area for all the wires for each of the distances and for the various number of amperes has been determined.

As it is necessary to multiply 10.6 by the distance multiplied by 2 in every instance, 21.2 is used instead and the straight distance used. The whole resolves itself into the simple formula:

$$\frac{21.2 \times \text{distance} \times \text{amperes}}{\text{Divided by volts lost}} = \text{area of wire.}$$

When these areas are found the commercial sizes of wire are inserted in the table which are nearest to the size found, but always larger, never smaller—that is, if the area found in the calculation came between a 0 wire and a 00 wire, the 00 wire would be the size used in the table.

Metallurgical Plant of Chas. Butters & Co., Ltd.

Chas. Butters & Co., on the 1st inst., opened for custom work an ore testing works, chemical and metallurgical laboratory and assay office in the Dooly Block, Salt Lake City, Utah, in charge of Mr. E. S. Leaver, formerly chemist and assayer at the Mercur, Utah, mill, but for several years associated with Mr. Butters in the laboratory and experimental work that has been of an extent commensurate with the interests involved. On the first page appears three views of the large establishment which is unusually extensive and complete.

The plant covers a ground area of 60x105 feet, the main shaft running through the center of the room, connecting directly and through countershafts with the many machines. Electric power is used. Among the machinery are two Gates crushers, sizes 0 and special; two Krupp ball mills, sizes 00 and smaller, with several sizes of screens for crushing any mesh desired; Wilfley concentrating table, magnetic separator, sample grinder, reverberatory roasting furnace with a capacity of 500 pounds per charge, spitzlutte, steam drier, sampling floor, centrifugal pumps, air compressor so connected as to use in any part of plant; forty-six vats of a capacity of 100 pounds to four tons, with numerous smaller tubs and apparatus; agitation vats up to 850 gallons, fitted up for auxiliaries such as air and steam. There are complete assay and chemical departments and scale room, separated from each other and from the metallurgical department by glass partitions and fitted up in modern manner. A drawing room and office are in direct connection. There are cement floors in the metallurgical departments to enable flushing. It is lighted with gas, sixty-four incandescent electric lights, and supplied with steam, sewer connections, etc., the whole constituting a finely appointed establishment. The engravings on the front page give a fair idea of the completeness of the model establishment.

Cyanide Plant at the Octave Mine, Weaver, Arizona.

Written for the MINING AND SCIENTIFIC PRESS by D. E. BIGELOW.

The illustration on the front page shows a MacArthur-Forrest cyanide plant for treating the tailings from the old "Rumer" mill, near Weaver, Arizona.

The tailings dump was purchased and the plant erected by Mrs. Cook, who has recently disposed of an interest to P. H. Newman, A. R. Howe and S. A. Barbee, who are now operating it under the name P. H. Newman & Co., with Mrs. Cook as assayer. This is one of the few instances where women are practically engaged in mining.

The picture shows how simple a cyanide plant can be made in a region where little or no protection from the weather is necessary.

There are about 4000 tons of tailings in the dump of the average value of $6 per ton, of which 90% to 95% is recovered. The plant consists of four leaching vats 12 feet diameter 4½ feet deep, two gold solution tanks 8 feet diameter 4½ feet deep, one sump 12 feet diameter 4 feet deep, all of redwood, painted two coats paraffine paint inside and outside, and twelve individual iron zinc boxes of 1 cubic foot capacity each.

The filter bottoms of the leaching vats are made of strips of wood 1¼x2 inches placed edgewise and nailed to the bottom of the vat 3 inches apart, with notches cut at intervals of 12 inches in bottom of the strips to allow free circulation of solutions. Spaces between the strips are filled with fine gravel, and the whole covered by cheese cloth and burlap, caulked around the sides with 1½-inch rope.

A large part of the values is carried by the slimes, which consist of about 15% of the whole dump, occurring in layers and patches several inches thick, and from the first their treatment has been the problem, now, however, happily solved as follows:

The cakes of slime as shoveled from the dump are thrown against a ¼-inch mesh wire screen, and being broken up fine, are mixed with coarser sand and charged into the leaching vats upon a layer of 2 feet of coarse tailings.

The vats thus charged contain eighteen tons of tailings each and are treated by five washes, each about 2½ tons, as follows:

No. 1. A strong solution containing ¼ of 1% cyanide is run into the vat from below and allowed to percolate upward through the pulp. The bottom of the solution tank is situated on a level with the top of the leaching vat, and the flow of the solution is controlled by a valve, so as to require three hours to fill. The solution is retained in the vat for twelve hours, and then drawn off into the gold tank, which operation requires four hours.

No. 2. A solution containing ⅛ of 1% cyanide is run on the top, requiring one hour to fill, twenty-four hours in contact and four hours to drain off.

No. 3. A solution of ⅛ of 1%, used same as No. 2.

No. 4. The rinse water of a previous vat, containing ⅛ of 1% cyanide, is run on the top and is drawn off after standing three hours. All above washes are drawn into the gold tank and brought up to strength of ¼ of 1% before passing through the zinc boxes.

No. 5. Clean water is run on, and after standing three hours, is drawn off into one of the gold tanks, to be used again before precipitating, as No. 4 wash.

The spent solutions, after passing the zinc boxes, are returned by hand pump to the solution tank above, brought up to required strength and used again and again for about two months, when it becomes foul with iron and impurities and is discharged.

The consumption of cyanide is one pound per ton of ore; of zinc, one sixth of a pound per ton.

The upper zinc box of the series is removed every day, the remaining boxes moved up and a new box placed at the bottom. The precipitates are washed

from the zinc and the residue, after filtering, is roasted in a common baking pan over a cook stove and afterwards melted in a crucible with fluxes as follows: Six pounds precipitates, five pounds borax, three pounds soda, one pound sand. One vat is filled each day.

The labor required is four men to screen, charge and discharge vats by wheelbarrow, one man to pump the solutions by hand and an assayer.

Chemical and Physical Properties of Mercury.

Mercury when pure is not affected by air at ordinary temperatures; when impure, its surface becomes coated with what is probably a mixture of mercuric oxide, oxide of the base metals, and metallic mercury. When heated in air to 350° C., or just below its boiling point, its surface becomes oxidized.

Mercury is practically insoluble in water, but is readily dissolved by strong nitric acid and but slowly attacked by dilute nitric acid. Dilute sulphuric acid does not attack it, but it is dissolved by strong boiling sulphuric acid. Hydrochloric acid does not dissolve it, while hydrobromic acid attacks it slowly and hydriodic acid attacks it rapidly.

It forms two series of chemical compounds, mercuric and mercurous. Chlorine, bromine and iodine combine directly with mercury. Sulphur combines directly with mercury, either in the form of vapor or by rubbing the two elements together.

Mercury possesses a property distinctive from that possessed by all other common metals of being liquid at ordinary temperatures, its melting point being—38.8° C. It solidifies at —40° C., and boils at about 360° C. It is somewhat volatile at temperatures far below its boiling point, and is completely volatilized at a temperature just above boiling.

It is a poor conductor of both heat and electricity; its heat conductivity being 5.33 and its electrical conductivity being 1.63, that of silver being taken as 100 in each case.

Its specific gravity in the liquid state is about 13.6, and in the solid state it is about 14.3. Its atomic volume is about 14.7.

When mercury is agitated with oil, fatty substances, turpentine, many other organic substances, sulphur, etc., it is split up into a number of minute globules which are invisible to the eye and form a soft gray powder. This is what is commonly called "sickening" or "flouring," and is a phenomenon recognized by all millmen. The phenomenon of "flouring" is not perfectly understood, but it is probable that the small globules of mercury are coated with a film or thin envelope of oxide or sulphide of mercury. Vegetable or animal oils cause flouring to a greater degree than mineral oils. Reducing agents have a tendency to promote the coalescence of the particles of floured mercury, some of the most active being the passage of the electric current through the floured mass, or by the addition to it of water and metallic sodium, the effect being attributed to the reducing action of nascent hydrogen.

Mercury readily alloys with most of the metals forming what are generally called amalgams. When the proportion of mercury is large the amalgams are fluid; as it decreases they become pasty, and finally solidify, forming crystals. Most metals unite directly with mercury to form amalgams, but nickel, cobalt, manganese, iron, chromium, aluminum and platinum do not unite directly, but their amalgams can be formed by electrolysis of a salt of the metal, mercury forming the negative electrode, or by the action of sodium amalgam on a solution of the metallic salt.

Mercury and antimony do not unite in the cold, but by heating an amalgam is formed from which antimony gradually separates as a black powder.

Mercury and sodium combine to form sodium amalgam, which may be prepared by gently heating pure dry mercury in a flask and introducing small pieces of metallic sodium from time to time. Each addition of sodium causes the alloy to glow and emit considerable heat. With eighty parts of mercury to one part of sodium the amalgam is pasty; with sixty parts of mercury it is a stiff paste; with forty parts of mercury it a soft solid, and with thirty parts of mercury to one part of sodium it is a hard crystalline solid. Corresponding amalgams are formed with metallic potassium. Sodium amalgam melts upon being subject to a gentle heat, and loses its mercury at a point below redness. Under water it decomposes rapidly, and in air slowly. It should be kept in dry air-tight vessels.

The purity of mercury may be tested by allowing it to run slowly down an inclined glass plate or over the bottom of a gold pan slightly inclined. If pure, it should form small bright spherical globules, which will unite into a mass upon bringing them into contact with each other. When impure, the globules will be elongated and have a tail and will not readily unite upon being brought into contact with each other. Impure mercury leaves a film upon rough blotting paper, and upon being shaken up in a bottle containing dry air a black powder rises to the surface.

Commercial mercury is sold in iron flasks weighing about five pounds each and containing seventy-six pounds of mercury. It is frequently impure, when it must be purified before using in the mill. Mercury which has been in use in the mill for some time will be found to contain base metals, and should be purified.

Several methods of purification are in use, but the best are by chemical treatment or by distillation, preference being given to the former. Distillation in a large iron retort similar to that used for the retorting of gold amalgam is efficient, provided the mercury is not very foul. If the surface of the mercury in the retort is covered with cinnabar, the product will be quite free from base metals, as they will be converted into sulphides as they rise to the surface and come in contact with the sulphide of mercury. Iron filings and caustic lime may also be used as a cover, and are efficient when the mercury does not contain much base metal. They serve to decompose sulphides and prevent bumping during distillation. When the mercury contains lead and zinc, the distillation methods are not effective, as these metals are largely distilled together with the mercury. In such cases, and also when copper is present, chemical means are best. Zinc, tin, copper and iron may be removed by shaking up the mercury with dilute hydrochloric acid. Agitating with dilute sulphuric acid will generally remove zinc and iron. The best method is to treat the mercury with dilute nitric acid (one part acid of about 1.42 sp. gr. and three parts water) in a glazed earthenware jar, holding about seventy-five to one-hundred pounds of mercury when two-thirds filled. The mercury and nitric acid are introduced into the jar and stirred vigorously from time to time with a stout glass rod. This treatment, lasting from twenty-four to forty-eight hours, should free the mercury from impurities, when it can be drawn off from the bottom of the jar by means of a top-cock inserted in a hole near the bottom. Impure mercury can be added to the jar from time to time. The solution, as it loses bulk by evaporation, is replenished by fresh water, to which a few drops of nitric acid have been added. The mercuric nitrate formed reacts upon the base metals alloyed with the mercury, nitrates of the base metals and mercury being formed. The purification of the mercury used in amalgamation should never be neglected, as the use of impure mercury invariably results in the loss of both gold and mercury during the amalgamation, and it also produces a base bullion which is difficult to refine.



Andrew S. Hallidie.

Andrew S. Hallidie.

Andrew S. Hallidie died at his San Francisco residence on the 24th inst., of heart disease, in the 65th year of his age. He was one of San Francisco's foremost citizens, and his fame is world-wide as the inventor of the cable railway street car system, which he first put in practical operation in San Francisco August 25, 1873. To Mr. Hallidie, more, probably, than to any other one man, does San Francisco owe its urban development. Prior to 1873 the trend of travel was suburban: he made possible rapid transit up the steep hills to the west of the then thickly settled parts of the city, the cable railway developing and building up that part of the peninsula between the bay and the ocean.

Mr. Hallidie was born in Dumfries, Scotland, March 16, 1836. He came to California in 1852, and while mining for gold studied engineering, built wire suspension bridges, and in 1857 established the first wire rope factory west of the Missouri. In 1867 he invented the "Hallidie ropeway" or aerial tramway, the well-known device to carry ore, etc., in suspended buckets by means of a wire cable across streams and gulches; in 1869 he began working on the cable railway, the greatest achievement of his busy life, which he put into successful operation on Clay street, San Francisco, in 1873. In 1868 he was elected president San Francisco Mechanics' Institute and held that office for ten years; he was also a prominent member and officer in nearly every local society for commercial or scientific advancement, was regent of the University of California for thirty years, and a trustee of the California School of Mechanical Arts and of the lately organized Wilmerding School. Last year he made an extended trip to secure a fitting principal for the school which has since begun its career of usefulness, and since his return to San Francisco labored zealously as was his wont for the many public interests with which he was so prominently and intimately connected. He was also a member of many scientific societies throughout the world.

Personally Mr. Hallidie was one of the quietest and most unassuming of men. He was of constant aid to young men, always ready with genial counsel and substantial assistance, and to the last took an active interest in everything pertaining to the industrial and public welfare of his adopted city, for whose material progress he did so much. All his life he went around doing good and made the world to a marked degree better for his having lived in it.

Growth of the Copper Industry.

The rapid growth of the copper industry in the United States and the large proportion which this country supplies of the world's copper consumption is illustrated by some figures presented by a German publication entitled "A Century of Copper." It shows that the United States has during the decade 1891–1900 produced more than half of the copper of the world, while in the preceding decade it supplied but about one-third of the world's production, and in the decade 1871–1880 the proportion supplied by the United States was only about one-sixth of the total.

The growth of copper production in the century has, according to this statement, been very rapid, being in the first decade 91,000 tons, in the fifth decade 291,000 tons, and in the 10th decade, which ends with 1900, 3,643,000 tons, of which 1,963,000 tons is supplied by North America, the large proportion of this being from the United States.

The greatly increased demand for this material is further illustrated by the fact that, although the production has increased from 505,909 tons in the decade 1851–1860 to 3,643,000 in the decade 1891–1900, the average price, according to the publication in question, has only fallen from $540 per ton to $253 per ton, production having during that time increased more than six-fold, while the price fell but about one-half.

While the world's production has increased with startling rapidity during the century, that of North America has by far outgrown all other parts of the world, and it is apparently through the enormous supplies of North America—chiefly the United States—that the world's production has so greatly increased. A table contained in this publication which gives the production of each decade by principal countries shows no record of production in North America earlier than the decade 1841–1850, in which period the total production is given at 2400 tons, while in 1851–1860 it was 37,000 tons, in 1861–1870 97,000 tons, in 1871–1880 186,000 tons, in 1881–1890 730,000 tons and in 1891–1900 1,963,000 tons, the copper production of North America in the decade 1891–1900 being thus 2½ times as great as in the preceding decade and ten times as great as in the decade 1871–1880.

In the matter of consumption the figures are equally interesting. A table showing the consumption of England, France, Germany and North America gives the total consumption in those four countries at 409,583 tons in 1899, against 268,447 tons in 1893, being an increase of about 50% during the period under consideration; while in North America alone the production is given 77,433 tons in 1893 and 162,000 tons in 1899, the growth being over 100% during the period.

The rapid increase in the share of the world's copper consumption supplied by the United States is illustrated by the export figures of the decade just ended, which show that the exportation of copper in ingots, bars and plates, which in 1890 amounted to 20,237,409 pounds, was in 1899 254,987,164 pounds, while the total value of copper exported, exclusive of ore, increased from $2,349,392 in 1890 to $35,983,529 in 1899.

The following table shows the value of copper manufactures of all kinds, including copper in bars, plates and ingots, in each year from 1890 to 1899:

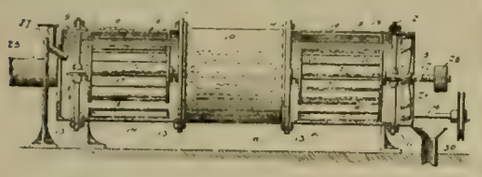
	Exported.
1890	$2,349,392
1891	4,614,597
1892	7,226,392
1893	4,525,753
1884	19,697,140
1895	14,468,703
1896	19,720,104
1897	31,621,125
1898	32,180,872
1899	35,983,529

Mining and Metallurgical Patents.

Patents Issued April 17, 1900.

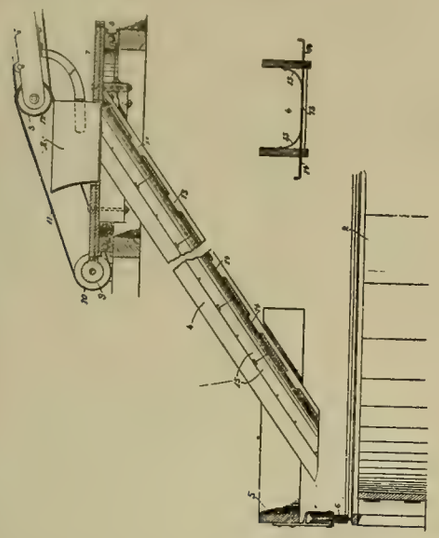
Specially Reported for the MINING AND SCIENTIFIC PRESS.

DRYING AND PULVERIZING APPARATUS. — No. 647,531; J. J. Seldner, Baltimore, Md.



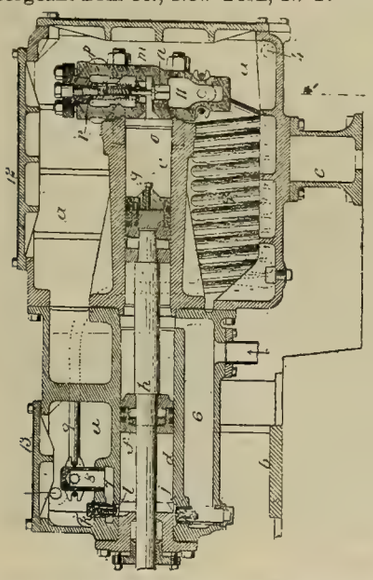
A combination of revolving cylinder comprising sections 10 having buckets, a rotating shaft arranged centrally therein, rings clamped between sections, central bearings for shaft supported by rings, frames 20 secured on and extending radially from shaft, and rods 21 extending between frames.

MEANS FOR CHARGING LEACHING VATS. — No. 647,678; C. W. Merrill, Alameda, Cal.



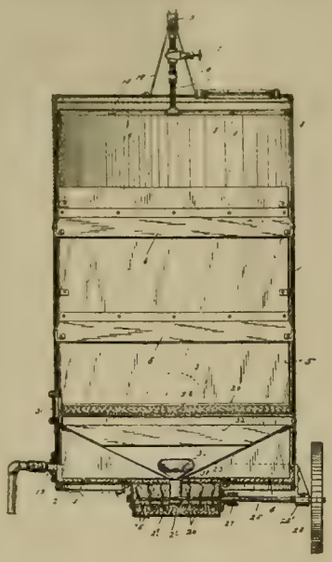
An apparatus for charging ore, tailings, etc., into vats or tanks consisting of an inclined hopper located and removable above the tank, openings made through bottom of chute at intervals in its length and gates or valves slidable transversely whereby openings may be transverse to one side or the other of chute and size of openings regulated; hopper located above upper end of chute and adapted to deliver material thereto, an endless traveling belt upon which material is delivered and by which it is transferred to the hopper.

COMPRESSOR FOR AIR, ETC.—No. 647,883; H. C. Sergeant, Westfield, N. J., assignor to The Ingersoll-Sergeant Drill Co., New York, N. Y.



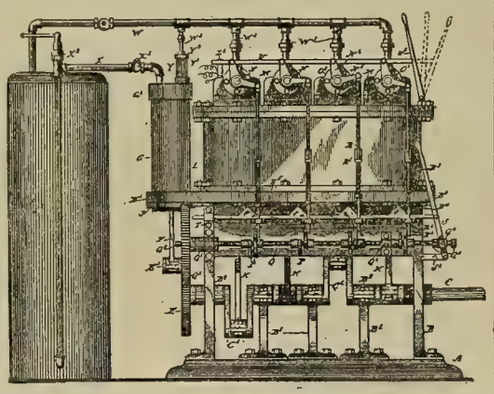
Combination in compound compressor, of cylinders and pistons for successive compressions, water-box in which cylinders and their valves are contained, cooler consisting of plurality of coils of pipe arranged in water-box, discharge pipe from first or low-pressure cylinder having plurality of branches communicating with coils at one end of each, chamber of communication common to other ends of several coils and valved communication between chamber and high-pressure cylinder.

APPARATUS FOR AMALGAMATING METALS. — No. 647,539; J. C. Teller, Minneapolis, Minn.



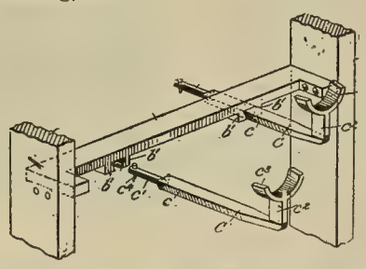
In an apparatus for collecting and amalgamating finely divided metals, combination with an amalgamating receptacle, of tube or spout delivering metal-laden fluid to intermediate portion, and an agitator mounted to rotate within amalgamating receptable, agitator having inclined propelling or agitating blades, blades on opposite sides of delivery end of spout or tube being reversely inclined, whereby the mercury and metal-laden fluid may be commingled under agitation and forced toward delivery tube or spout.

EXPLOSION ENGINE.—No. 647,583; C. A. Scott, Cedar Rapids, Iowa.



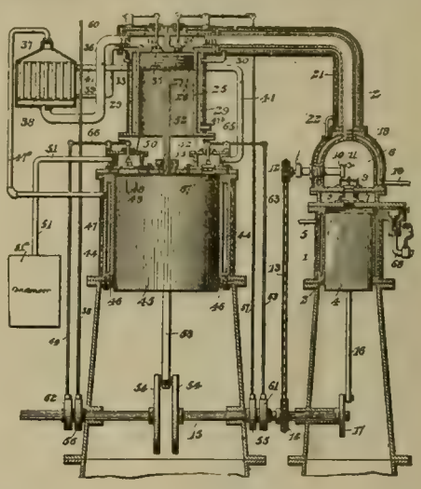
The combination with an explosion engine having a vapor compressor auxiliary to the explosion cylinders, of a throttle to control supply of compressed vapor and isolate contents of cylinders from that of the compressor during explosion, an electrical igniter, and an electrical connection of igniter with the throttle mechanism, whereby the electric circuit may be broken by throwing the throttle to an extreme position in opening; combination of gas inlet valve, connection thereof with actuating cam, a cam shaft provided with duplicate, reversed cams, means for shifting cam shaft so as to bring either cam into engagement with the valve mechanism, and means for disengaging cams from valve mechanism while the cam shaft is being shifted.

METALLURGICAL FURNACE.—No. 647,662; J. Lanyon, Pittsburg, Kan.



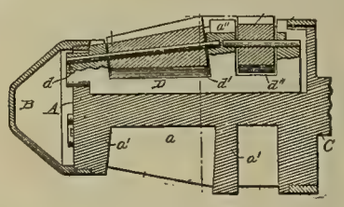
In a smelting furnace, the combination, with pair of buckstays, and a bearing bar located between buckstays and provided with outward-bent ends secured to buckstays, ends having sockets, of retorts carried by bearing bar, condensers connected to retorts and having sloping under sides, and supporting arms pivotally mounted in sockets in bearing bars and arranged to swing into close contact with under side of condensers.

GAS ENGINE.—No. 647,651; W. R. Dow, Boulder Creek, Cal.



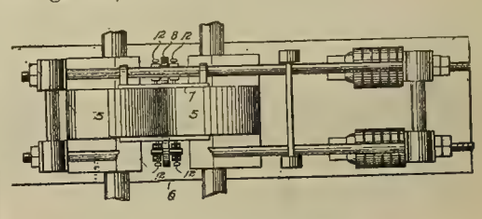
In an engine, the combination of jacketed gas and steam cylinders, pistons operating in cylinders and connected for simultaneous movement, valved means for admitting gas under pressure to the gas cylinder, consisting of an explosion chamber and conveyor provided with jacket in communication with that of the gas cylinder, water supply pipe in communication with jacket of explosion chamber, valved exhaust for gas cylinder, valved inlet and exhaust ports for steam cylinder, condenser in communication with exhaust of steam cylinder, and water heater having a chamber in communication with exhaust of gas cylinder, and also with latter, being provided with final exhaust port for hot gases supplied to steam cylinder jacket from water heater, water heater also having a water receptacle in communication with jacket of gas cylinder to receive water therefrom, and with inlet port of steam cylinder to supply steam thereto.

DEVICE FOR REMOVING SCALE FROM BOILER TUBES. —No. 647,672; W. D. Forsyth and E. T. Bell, Pittsburg, Pa.



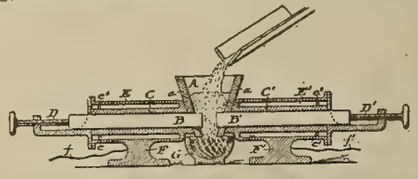
In a tube cleaner, a rotary head, centrifugally-acting arms mounted therein, each arm having journaled on it a single elongated inclined rolling cutter having an uninterrupted inclined cutting face adapted to make an inclined cut in the scale, and finishing cutters following first-named cutters.

PULVERIZING ROLL.—No. 647,894; A. Barmettler, Georgetown, Colo.



Combination with pair of pulverizing rolls of equal length having their axes in the same horizontal plane, of wheels mounted adjacent and engaging ends of both rolls at extremities of tangential line between them, whereby an ore receptacle is formed bounded by the rolls and wheels.

ELECTRIC FURNACE.—No. 647,614; M. Ruthenburg, Philadelphia, Pa.



In an electric furnace, combination with opposed terminals of an electric circuit, of a bosh laterally inclosing terminals, and open at top and bottom thereof, a crucible directly beneath bosh in relatively movable relation therewith, and an overflow outlet at the the top of crucible.

Some Observations on Practice of the Cyanide Process at Mercur, Utah.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by WM. MAGENAU, E. M.

The importance of careful and even packing of the zinc in the boxes and rearrangement at such intervals as to break up the channels without disturbing the zinc oftener than necessary has been properly emphasized by several writers, and the experience with these poor solutions strongly corroborates their observations. In one case where 260 pounds of zinc were kept in the boxes, distributed in forty-one compartments arranged in eight rows, the solution in passing through was reduced from $1 to from 20 to 30 cents. On changing this equipment to 220 pounds, distributed in twenty-two compartments arranged in five rows, the value left in outflowing solution was normally from 5 cents to 10 cents, while at the same time the amount of zinc consumed was reduced from .45 to .25 pound per ton of ore treated.

The methods of cleaning up the gold precipitate are adapted to the low grade of product obtained, which latter is the result of several conditions—first, the solutions carry in suspension considerable siliceous slimes which stay with the gold, and the gold in solution being in such minute proportion the amount of slimes deposited is large per ounce of gold. Then the amount of disintegrated zinc is also large, reducing the gold to below 6%. Some analyses will be given later.

The usual procedure of screening out the gold and fine zinc is followed, screens from 4 to 16 mesh being used. An efficient arrangement for precipitation consists of plain wooden boxes provided with false bottoms made of slats ½ inch by 1 inch and placed ¾ inch apart. These serve merely to support the zinc and allow the solution free circulation underneath. Solution flows alternately up and down. With intelligent handling of the boxes during a run the valuable fines can be separated from the coarse zinc without any screening, but by screening any lumps are broken up and a better material for sampling is obtained.

Various modes of manipulation are in vogue. That to be described has been used by the writer with good success. The flow in one row at a time is stopped, and the richer material, which has been concentrated in the upper compartments towards the end of the run, terminating in the cleanup, is transferred into iron tubs, without draining the solution from the boxes at all. The two top compartments only are cleaned out by scraping up the precipitates with a small scoop without removing the solution. Fresh zinc is put in and the flow re-established, when another row is similarly handled. Thus but one row at a time is out of operation.

Most operators would at once declare that this procedure must result in great losses by gold being carried off in suspension on restarting the flow, but this seems to be here prevented by the siliceous slimes present. On disturbing the richer zinc dense clouds of the suspended slimes rise in the solution, and before a row is half cleaned out the liquid is entirely milky. Each row has five or six empty compartments below those filled with zinc, and in passing through these part of the slimes settle and carry with them nearly all the floating gold. Repeated trials of the outflowing solution on a continuous sample taken during the entire cleanup show a rise of only 10 or 15 cents per ton of solution. With a perfectly clear solution the value of outflowing liquid has been known to go as high as $40 per ton.

The tubs of "product" are screened into a small tank, from which the supernatant liquid is decanted as soon as the screening is finished. This liquid, rich in suspended gold, is allowed to settle in another tank until the next cleanup, its excess liquid being then returned to the top compartment of one of the zinc rows. The drained product is removed to a steam dryer consisting of a circular cast iron pan 5 feet by 7 inches provided with a double bottom, in which live steam circulates. With this device, and forty pounds steam pressure, 500 pounds product could be dried to 1% moisture in six hours (taking one-half at a time). A similar dryer can be made of riveted boiler plate at less expense.

At some mills the drying is done in iron pans placed in a large cast iron muffle, and also in large amalgam retorts, and on top of iron plates heated from a fireplace. However it is done, this material is then boxed and shipped to the smelters (with one exception, to be mentioned further on). The metallic cases in which cyanide is received are used for this purpose. The output of the district is handled by the Consolidated Kansas City Smelting & Refining Co. (now one of the smelter trust), who have receiving and sampling rooms established in Salt Lake City. The express charges on product of average grade amount to 12 cents per ounce of gold. Twenty dollars per ounce is paid by the buyers. It might be of interest to insert at this point a description of the methods employed in sampling and assaying this rich material, as much has been said by the advocates of local refining about the difficulty of arriving at correct figures for settlement. As to sampling, it is surprising how nearly correct a result can be got from a single hand grab from the material which has been screened and dried, it having been well stirred during the latter operation. The following method was used as a rough check and to obtain an approximate value for billing out a shipment. The whole lot, amounting to say 400 pounds, was coned upon a large tin-covered table adjoining the dryer, an ordinary shovel being used. The cone was flattened into a pile which would be about 5 feet across and 5 inches deep. With a large spatula dips were made to the bottom of the pile all over its surface at intervals of about 6 inches. These quantities being piled up together, and amounting to some ten pounds, were well mixed and spread into a smaller pile, from which dips were again taken at intervals of an inch or two. This operation was repeated, with careful breaking up of small lumps with the knife, until fifteen or twenty grams remained, and this quantity was rubbed to a fine powder in a wedgewood mortar. A result from one-tenth assay ton of this sample usually checked the final settlement figures to within $200 on a $5000 lot, and was often very much closer.

The samples for settlement are made by the buyers by the old system of coning and quartering, great care being observed and the operation being conducted in a room lined with tin. This permits the collection of accumulated valuable dust. The amount of this from any one lot is said to be very inconsiderable. The final sample is ground and put through an 80-mesh screen. No attempt is made to force through the coarse particles of zinc remaining, but these are carefully separated and weighed, and accompany the fine portion, whose weight is also taken, from which they came. The method of handling these will be touched upon in describing the assay. For several years one of the larger mills systematically sampled each lot by the method to be next described as a check on the cone quartering plan, and the results were so consistently similar that the extra sampling was abandoned as superfluous.

At this place the product was dried in muffles and the free zinc was allowed to burn off. In this operation it became well mixed. Next it was coned upon a square tinned table 5x9 feet in size and provided with a 5-inch guardboard around the edge. The lot was evenly spread out on this table and the surface marked off in squares 5 inches on a side. From each of these a dip was taken with a broad spatula. These quantities were reconed together, and further reduction made by quartering, all lumps having been broken. The final small sample was put through an 80-mesh screen, hard rubbing in a wedgewood mortar being required to comminute the last particles of zinc.

Following are given some results obtained by this method on a lot (of unusually low grade) sampled in triplicate:

		Sample No. 1.	Sample No. 2.	Sample No. 3.
		Oz. per ton.	Oz. per ton.	Oz. per ton.
Assayer A	Au	714.05	704.40	704.45
	Ag	13.9	5.6	4.7
Assayer B	Au	711.60	712.15	703.8
	Ag	19.5	19.0	20.0

While some of the differences seem to be considerable, they are small in relation to the limit of accuracy in the methods of assaying, and also amount to but little in dollars and cents figured on lots of from 500 to 1000 pounds.

The assay is conducted by fusing one-tenth assay ton in the crucible with a litharge flux. The slag is run down with more litharge and the gold obtained from this added to that got from the original fusion. Corrections are also applied for cupel absorption. Perhaps a clearer idea of the method can be given by putting it in the form of a "scheme." The sample comes divided into two parts—pulp and metallics. First, for the pulp, take six charges of .1 assay ton each (weighed on analytical or good pulp balances) in ten-gram crucibles. Mix thoroughly with the following flux:

	Grams.
Litharge	70
Sodium carbonate (dry)	5
Flour (variable, but about)	1
Silica (variable with composition of product)	1 to 5
Borax glass	2

When mixed put on a heavy cover of salt, say two heaped teaspoonfuls. Place in a hot muffle—the hotter the better—and fusion will take place without spattering in twenty or twenty-five minutes. The slag will be exceedingly limpid and is to be poured into moulds and thoroughly cooled. The lead buttons (which should weigh from twenty-five to thirty grams) will separate beautifully from the slag, but each slag must be put back into its own crucible and run down with one gram of flour and a little litharge, soda and borax added, to collect any accidental shots. The slags invariably carry some value, probably due to a slight film of zinciferous lead which rises to the surface of the lead button and clings to the slag. A rough crushing of each slag on the buckboard is recommended, it being placed between two pieces of cloth to avoid losses. The lead buttons from the original fusion are cupelled with feathering, as in any bullion assay, and the cupel is afterwards ground and fused, its gold contents being added to that obtained directly. Each cupel need not be assayed separately, since, unlike the slags, the amount retained in them is very nearly the same in any one lot. So, usually two of them (taking only the parts containing absorbed litharge) are put together in a twenty-grain crucible and fused with this flux:

	Grams.
Sodium carbonate	40
Silica	10
Borax glass	10
Litharge	20
Flour	1

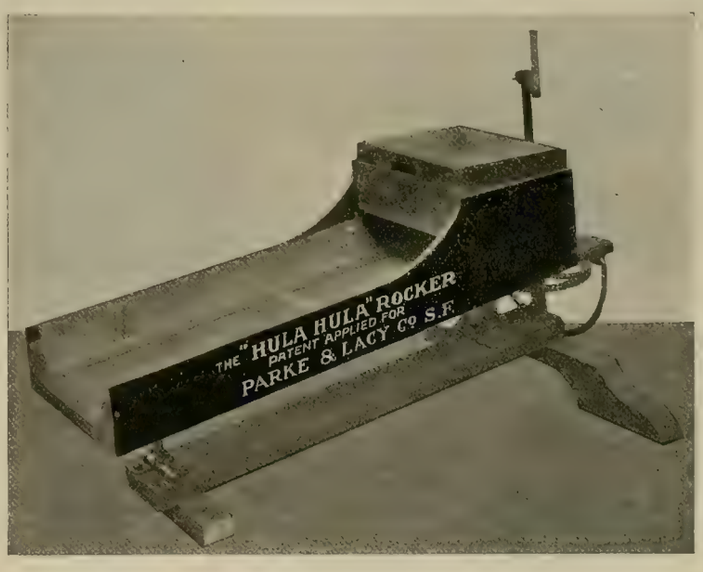
and a borax glass cover. The fusion takes a high heat and a long time, but finally a very perfect slag is obtained.

The gold-silver prills obtained from the original cupellation are weighed and then inquarted up to the regulation two and one-half parts of silver, the subsequent parting and weighing of gold being the same as in the assay of Dore bullion. When the inquartation is made on a cupel this cupel is also to be assayed and its absorption added to the main figures. In Mercur practice all these corrections are applied for gold only, the amount of silver present being insignificant.

(TO BE CONTINUED).

The "Hula Hula" Rocker.

The machine herewith illustrated consists of a wooden box mounted upon ball and socket bearings at each end and having its motion imparted to it through a gear and pinion which are operated by a crank handle. The shaft which carries the pinion is eccentric and carries a weight on one side which throws it out of balance and causes the effect of the pan motion, while the rocking motion is obtained by means of a yoke which is attached to the upper end of the box and which rests in a ball and socket joint on the lower frame of the machine. There is a screen box, similar to that used in the ordinary rocker, at the upper end of the machine, and below this two riffles inclined in opposite directions, and the bottom of the machine is covered with a strip of carpet. The force of the movement of the machine is regulated by the speed at which the handle is turned and is under the control of the operator. It can be made heavy or light at will, the machine being thus intended to be adapted to the working of the heaviest sands or lightest cements. It weighs 115 pounds; can be taken apart and transported anywhere by hand; no wrench or screwdriver is required in taking it apart or setting it up. The price of the "Hula Hula" rocker, complete, is $30, delivered f. o. b. It is furnished by Parke & Lacy Co., sole agents, 21–23 Fremont street, San Francisco, Cal.



The "Hula Hula" Rocker.

MINING SUMMARY.

ALABAMA.

Following are 1899 mineral statistics of production: Coal, 7,484,763 short tons; coke, 1,798,612 short tons; pig iron, 1,083,905 long tons; iron ore, 2,627,000 long tons; stone for flux, 635,514 long tons; building stone, 63,614 cubic feet; bauxite, 14,144 long tons; lime, 225,000 barrels; graphite, 50 to 60 short tons.

ALASKA.

A. H. White, at Gravena island, is developing a gold and copper mine. He will have the first stamp mill in operation in the Prince of Wales island section, having purchased a 20-stamp mill.

Chas. G. Yale, the statistician of the U. S. Mint at San Francisco, states that the returns show that the district of Alaska has more than doubled its bullion product in the last year. The receipts of Alaska gold at mints, assay offices, refineries, smelters, etc., for the calendar year 1899 were $5,602,012 and silver $229,343, a total of $5,831,355, or $3,199,844 more than in the year 1898. Of this increase it is estimated that $2,400,000 came from the new placer camp at Cape Nome last season, the first year in its history, and the rest of the increase from the quartz mines of southeastern Alaska. The placer camps along the Yukon river give evidence of only slightly increased yield for the year. In southeastern Alaska, including Douglas and Unga islands, the quartz mines are now operating 1050 stamps and employing 1308 men, at average wages for miners of $2.50 per day and board. The combined output of these quartz mines for 1899 was $2,704,176 out of a total of $5,831,355. This makes the yield of the placer mines of the district of Alaska $3,127,179, of which $2,400,000 came from beach and tundra claims at Cape Nome and the remainder, $727,179, from the placer camps along the Yukon river and its tributaries, placers near Golovin bay, the beach-sand mines at Lituya bay, the hydraulic mines near Juneau and the claims in Porcupine district, southeastern Alaska.

The Secretary of War states that no more permits for deep-sea mining at Nome will be granted until Congress has acted on the Alaska civil government bill. Under one section authority to grant such permits is taken away from the Secretary of War.

Mgr. C. Plaut of the Latauy Bay Placer M. Co. says he will have a dredger brought up, capacity 2000 yards per day, to use this season.

The latest advices from Cape Nome are to the 24th inst. The usual report of fresh discoveries are of course to hand to increase the crowd who are flocking up there, 99 out of 100 to be cruelly disappointed.

The fuel supply at Nome up to Jan. 24th was a serious problem. Wood was bringing $40 per cord and $125 per ton was asked for coal.

T. D. McDermott reports finding a quartz ledge on Basin creek, 12 miles from Nome, that assayed $250 per ton.

Chas. Crane is working the beach sands with a steam thawing plant.

ARIZONA.

APACHE COUNTY.

The bill opening for mineral operations that portion of the Navajo Indian reservation in north latitude 36° 30′ has passed both houses of Congress. The portion of the reserve opened contains some mining prospects, and Colorado and Utah people are expected when the formal opening takes place.

COCHISE COUNTY.

Benson Press: From Cochise station, in the Dragoon mountains, the Peabody mine ships weekly seven carloads. From the St. George mine five tons are shipped each alternate day. A number of claims are shipping wolfram.

The Black Diamond Co. will push work on its property in the Dragoons. Supt. Henry will put in an air compressor plant, four drills and other machinery. Test shipments give good copper values. One average test of 1000 pounds shows 17% copper.

GILA COUNTY.

At Globe the Old Dominion is daily receiving ten cars coke. The smelter is now turning out from 75 to 85 bars (300 pounds each) of black copper daily. The company has purchased the Rochester and Uncle Sam mining claims.

Prof. Douglass of the United Globe has determined that the ores are not suited to smelting, and they will ship on to El Paso. Supt. E. H. Cook of the United Globe mines has gone to El Paso to arrange for shipping ore to that point.

The Black Warrior Co. is working sixty men.

Supt. Collins of the Octave Co. at Stanton has bonded twenty claims west of Globe for $125,000, all to be paid within nine months, and is working twenty men under the management of P. J. Cole of Phœnix.

MOJAVE COUNTY.

The Juno mine at Chloride is reported in bonanza. A new concentrator has been ordered.

PIMA COUNTY.

At Helvetia Mgr. J. B. Seager says he has water enough for the season's operations. The daily capacity of the smelter is 175 tons. He will put in a dynamo and have electric lights for all needs. The town has 1200 people. The pay roll numbers 420 now.

PINAL COUNTY.

At the Ray mine the 250-ton concentrating plant is expected to be ready to run June 1. The ore railroad is now in operation, running from the mines to the mill, and the traction engines are being successfully operated in carrying the freight of the company from Red Rock on the Southern Pacific to the works on the river; R. V. Truman, Mgr., N. B. Wilcox, superintendent construction.

CALIFORNIA.

AMADOR COUNTY.

The Shenandoah Con. M. & M. Co. has incorporated; capital stock $200,000, $9000 subscribed; E. B. Cutter, E. W. Ferguson, T. J. Parsons, J. Dolbeer, G. D. Gray, S. K. Thornton, E. S. Hadley, S. Rosenbaum, T. Kilpatrick.

CALAVERAS COUNTY.

C. M. Burleson, Supt. Vorlander mine, wants sealed proposals for drifting north and south along the vein on the 150-foot level.

At Murphys the De Lay tunnel is in 600 feet. Supt. Tucker is developing the Big Horn mine, at Murphys, and intends to erect machinery this season.

The Melones tunnel is now 2700 feet in length.

Chronicle: Two hundred tons of ore are being hauled from the Commodore mine, near San Andreas, to the Ford mill to be put through as a test. It is said that if the rock will average $4 to the ton, a 60-stamp mill will be erected at once.——The ore shipped from the Eudora at West Point yielded $135 to the ton. It cost $20 per ton to haul from West Point to the depot and $20 more for railway transportation and reduction. Nearly all the mines of West Point district are high-grade though rebellious ore, the drawback being the heavy cost of transportation.

EL DORADO COUNTY.

Mgr. Vance at the Starlight mine keeps the 10-stamp mill running steadily. It is owned by Hawley Bros. of San Francisco. Mr. Neilson is underground Supt.

The Oro Fino mine is run by water power of 150 inches from the Park Canal Co.'s ditch. The shaft is 700 feet. The 30-stamp mill is kept running night and day; 125 feet hydraulic pressure in 13-inch pipes runs the hoist, mill and chlorination works. Ninety tons ore every twenty-four hours yields $6 per ton.

INYO COUNTY.

At Darwin the Lane mine is working twelve men. The Defiance mine has resumed.

At Ballarat the World Beater has put up a mill.

Searle's Borax Works are producing 100 tons per month.

KERN COUNTY.

The Big Blue gold mine, near Kernville, is sold to Senator J. P. Jones, for $75,000.

MARIPOSA COUNTY.

At the Francis mine Supt. L. Wagoner is locally credited with intention to put up a 10-stamp mill.

At the Mariposa mine the east drift is in 170 feet. The ore runs $12 per ton. Next week a station will be cut at the 475-foot level and a drift run to the east to determine the size of the ore body through which the 275-foot level is being run.

At the Princeton mine the bottom of the old works was struck at 550 feet last week. The bottom of the old works has now been reached in each of the five grant mines, and next week work in new ground will be pushed in all of them.

Mariposan: F. A. Brown of Coulterville has placed the Pleasant Valley water right on the Merced river with C. E. Hahn of the Columbus Co. It will carry 20,000 inches of water with 150 feet of fall. Mr. Hahn is grading for a 20-stamp mill, to be erected at once. A 30-foot dam is to be constructed on the above-mentioned water right 4 miles below Benton mills, a flume carrying 12,000 miner's inches of water per minute to be built from the dam to Horseshoe Bend, where the electric power plant is projected.

MONO COUNTY.

Mgr. E. J. Andrews of the Dunderberg mines, Bridgeport, has paid the balance of $20,000 due on the bond given for the Dunderberg, now owned exclusively by A. D. Cullum of London, who has named the mine the Castle Peak, and will further develop and improve the property.

The Red Cloud mine at Bodie is now owned by J. B. Haggin, Mrs. Phœbe Hearst, P. Reddy, W. H. Metson and J. Cain. Work has begun for a new hoisting works.

NEVADA COUNTY.

(Special Correspondence).—The experts in the lawsuit between the Grass Valley Exploration Co. and the Pennsylvania Co. have about completed the preliminary work and the case will come to trial shortly. The Grass Valley Exploration Co., who own the W. Y. O. D. mine, claim the ore worked and now being worked by the Pennsylvania mine. Ross E. Browne and W. F. Engelbright are experting for the Pennsylvania mine; Louis Janin and Mark B. Kerr are doing the same work in the interest of the W. Y. O. D. mine. Messrs. Curtis Lindley, Searls and Kitts are the lawyers for the Pennsylvania Co. and Judge John Garber and P. F. Simonds are retained by the Grass Valley Exploration Co. It is expected the case will bring up some new and important facts in mining decisions.

Grass Valley, April 24.

The Jenny Lind M. Co. has levied assessment No 2 of 1 cent per share upon its capital stock.

Supt. J. W. Morrell, Hudson mine, Rough and Ready district, tells the Herald he has bought for his company 190 acres more, which gives the company 210 acres of surface.

Union: Geo. Mainhart has sold the Erie group to O. A. Turner, who will build a 20-stamp mill and develop the property.

PLACER COUNTY.

(Special Correspondence).—The Hidden Treasure, with its main work at Centerville, eight miles from Iowa Hill, is the most extensive gravel mine in California. This company began operations at Sunny South, three miles from Centerville, twenty-two years ago, and until 1896 prosecuted its work through the tunnel terminating at the former place. Eight thousand feet from the mouth of the tunnel the channel of white quartz gravel was cut off abruptly by a blue gravel lead that was being worked as the "Dam Claim." This latter claim was purchased by the Hidden Treasure Co., and since the purchase of that and contiguous ground, operations have become focused at Centerville. The white gravel channel was rediscovered 60 feet beyond the blue gravel cut-off, and both channels, each upon its own level (varying 25 feet), are now being worked by the Hidden Treasure Co. Some rich gravel is now being taken out of the "black channel," or the original Dam claim, which encourages the company to continue its development. It is to prosecute this work that an electric hoist was recently put in. The difference in the gravel is strongly marked. In one channel it is loose, white and friable, and can be breasted out with pick and shovel; in the other channel it is strongly cemented, requiring powder blasts to break it down. The tunnel which runs into the hillside from Centerville strikes the white channel 8000 feet from its mouth, following the level of the Dam tunnel 6000 feet, and then branching off, and rising by an easy grade 25 feet within the next 2000. At this latter point the gravel is being extracted to the extent of 225 to 250 carloads per day (twenty-four hours), and is hauled to the mill in trainloads of fifteen to thirty cars by means of an electric trolley line. Ten trips per day are made. It is dumped from the cars by hydraulic connections, and falls into the bins, where it is sluiced into the flume leading down the canyon. All of the operations of the mine are systematic. It is a regular dividend-payer, and promises to continue such for many years. H. T. Power is the Gen. Mgr. and principal owner; M. Holt, Supt. About 200 men are employed, something more than half of whom are Chinese.

The Red Point mine, four miles from the Hidden Treasure, is an interesting gravel proposition. There is here one of the longest tunnels worked from a single opening that can be found in the State. This tunnel was driven into the hill for 2000 feet as a crosscut; here it struck the locality of the gravel channel, and this it has continued to follow for a distance, in the aggregate, of three miles. In a tunnel so long as this, ventilation is an important factor. This is accomplished by blowers, which force pure air to the face of the tunnel. The gravel is strongly cemented, in a channel averaging 70 feet in width, but slacks quickly upon exposure to the atmosphere, and then washes freely. Three thousand carloads per month is the output. The cars are propelled by a compressed air locomotive, there being a charging station at the mouth of the tunnel, and another at a central point inside. Fourteen cars of one-half-ton capacity each constitute a load, and these are run at a speed of fifteen miles per hour. The air is compressed at power houses located in the steep ravine below the mine. Water which runs out of the tunnel (unvarying in amount through the entire season) is utilized twice under a fall of 500 feet in each instance, creating ample power for the purpose required. A French syndicate owns the Red Point. Seventy men are employed, with J. A. Ferguson as Supt.

Iowa Hill, April 14.

Boston News Bureau: The Pioneer M. Co. held a meeting Saturday. The mine was closed down on April 5th and only three men are now employed there. The company's surplus has shrunk from $50,000 to about $1000. The directors represent 10,000 shares of stock and suggest that an assessment of 50 cents per share be levied. The stock is non-assessable under Montana laws except three-quarters of the stockholders agree to an assessment. It was the sense of the meeting that the company be reorganized, and it was voted to refer the matter back to the directors with the request that they devise a plan of reorganization.

Boston News Bureau: The directors of the Pioneer M. Co. are expected to meet this week to discuss plans for financial relief. A director says: "I personally favor the calling of a 50-cent assessment, payable in two installments of 25 cents each. If $25,000 is sufficient, and I believe it will be, why of course the remaining $25,000 need not be called. I am decidedly opposed to running the company in debt. We recently ran the mill, twelve hours a day, but the rock was of so low grade that only $2600 in bullion was produced. We have been expending our treasury funds at the rate of about $5000 a month. Additional funds must now be raised with which to continue our explorations for profitable ore bodies. I believe such ore bodies exist in our property, but it will take money to find them."

PLUMAS COUNTY.

H. W. Hammond of the Plumas D. & M. Co. of Pittsburg, Penna., is at Johnsville, examining the Thompson or Mammoth quartz mine.

SHASTA COUNTY.

F. Iler, one of the owners in the property operated by the Elizabeth G. M. Co., near Iron Mountain, talks of a 40-stamp mill at the mine. He says there has accumulated several thousand tons that will assay $4 to $5 a ton, and that the pay quartz is worth $8 a ton.

Mineral Wealth: The Midas mine at Harrison Gulch has a continuous pay shoot over 3300 feet in length. While the ledge varies in size considerable throughout this length, the ores are of continuous high grade, and are all crushed in the mill.

SIERRA COUNTY.

W. E. Howell will operate the Pilgrim mine, five miles from Forest City. A 20-stamp mill will be built there.

SISKIYOU COUNTY.

Yreka Journal: A Pittsburg, Penn., company has bonded two miles of ground at Callahans, in South Fork of Scott river, for dredging, and will put in three dredgers, one along the bank on each side, another in center of stream.

TRINITY COUNTY.

The Cie Fse mine will have a good supply of water for two months yet. The La Grange mine also has plenty of water and is working a large force of men.

The Heurtevant mines on Red hill have done well this season.

At Dedrick, 12 miles from Junction City, all the quartz mines are looking well. There is to be another mill built on the Maple mine, owned by Homer Wilson of San Francisco.

Searchlight: At Junction City the water supply for small mines is low and the season is almost over.

Mineral Wealth: A 40-stamp mill will be built at the head of Jerusalem creek to crush the ores from the Bullychoop mine. These mines are located on the Trinity county side, but will be opened from the Shasta side of the line by tunnel. The Mountain G. M. Co., organized under laws of Arizona, will operate the property. The company will build a wagon road to the mill site. Work on the lower tunnel, which will cut the ore 500 feet below the present lowest level, has begun.

TUOLUMNE COUNTY.

At Quartz the App and Dutch mills are to have each twenty more stamps.

Sonora Democrat: Eight tons ore from the Hope mine netted S. Ralston $90 per ton.——At the 250 level the Densmore reveals a richer body of ore than heretofore encountered.——This week a test run on six tons of ore from the Draper mine was made at the Bonanza mill. The test was eminently satisfactory and an agent has gone below to purchase machinery for the mine.——The Goldwin mine property is in shape for operations. This week contracts will be signed for equipping the mine with all necessary machinery.

COLORADO.

BOULDER COUNTY.

Despite the many warnings in this paper of the danger attending careless thawing of giant powder, the following deplorable occurrences continue to be chronicled: On the 16th inst. Andrew Wise, aged sixty-five, and his son Joseph, aged thirty, were instantly killed by an explosion of giant powder at the shafthouse of the Eldorado tunnel, near Sunshine. John Walmsley, a blacksmith, was badly injured at the same time. Wise was thawing powder in hot water when 150 pounds exploded. The father and son were literally torn to pieces. The building 50x100 feet, was wrecked. Walmsley was badly bruised and his arms and head were torn by splinters.

Mgr. Teal of the Pennsylvania mine and mill, Ward district, has a retort of gold weighing eight ounces, representing the savings on the plates at his company's new mill for a two days' run, which pays the expenses of mining and milling seventy tons of ore. The profit is in the concentrates from this first run of two days, amounting to about eight tons running $40 a ton. Five men can keep the 40-ton stamp mill going, the work being almost entirely automatic. Mr. Teal says he can load the ore and convey it to the stamps for 5 cents a ton.

CLEAR CREEK COUNTY.

Near Idaho Springs the Gen Extension vein has been cut by the Newhouse tunnel at a depth of 2000 feet, giving 1500 feet of new stoping ground. The vein carries three streaks from 10 to 12 inches wide of smelting grade. The ore runs in copper and lead, as well as gold and silver. The tunnel is now 8800 feet in length and will be extended 2500 feet from the present breast to cut other veins.

Post: Idaho Springs reports another strike in the Newhouse tunnel, the Gem Extension vein having been cut. That property has been operated for the past eight years under the management of W. E. Renshaw. The vein where cut in the tunnel is at a depth of over 2000 feet, and, as the shaft is down to 600 feet, considerable work must be done to connect the upper workings with the tunnel. A contract has been made with the tunnel company whereby work on an upraise will commence as soon as the breast of the tunnel is far enough ahead, so that the work will not interfere with the pushing ahead of the tunnel. The shaft has recently been enlarged and retimbered and sinking will commence at once. An air compressor will be put in to carry forward the work of development, and at a depth of 700 feet a hoist will be installed which will be operated by compressed air. This independent hoist will be lowered every 200 feet the shaft is sunk, and levels will be driven 100 feet apart; by this means the development can be continued and at the same time a large force of men can be engaged in getting out the mineral from the various openings. The vast amount of ground that will thus be opened will give employment to many men. The cutting of the Gem vein will open up ore bodies at the greatest depth in this county, and proves the theory often advanced by mining men that what this section needs is deep mining, and this has proven true in every case where any great depth has been attained. The Newhouse tunnel has now reached a point nearly 9000 feet from the mouth, and it had been estimated that the Gem should have been encountered nearly a month ago; but this delay is now explained, as it is found that the pitch of the vein changes with depth and dips considerably more to the north. The breast is about under the Clear Creek–Gilpin county line and is being pushed ahead at the rate of over 200 feet per month, working one shift of two air drills.

GUNNISON COUNTY.

Near Vulcan, at the Dubois tunnel air drills are now used. The tunnel is about 1000 feet in the hill and at 300 feet farther will reach the Pride of Denver vein. Several small veins have been cut.

LAKE COUNTY.

S. P. Brown of Twin Lakes has sold the Gordon mine for $200,000—$50,000 down—to D. E. Murphy of Milwaukee, F. C. Smith of Deadwood and O. Williams of Denver, who have incorporated the Gordon-Tiger M. Co., of which they are the directors. They will erect a stamp mill within six months.

OURAY COUNTY.

A 5000-foot aerial ropeway, with an elevation of 1809 feet between terminals, is to be built at the American–Nettie mine, near Ouray. When the new mill, now building, is completed the number of miners employed will be increased from 30 to 100.

ROUTT COUNTY.

The manager Hahn's Peak & Leadville M. & I. Co. says the company has decided on plans for next season's work on its interests in Columbine basin, on the western side of the peak.

SAN MIGUEL COUNTY.

The new Smuggler and Bessie mills are now both in operation and are supplying 300 tons of ore to the daily Telluride product.

SUMMIT COUNTY.

Mr. W. C. Tracey of Kokomo, working the Mountain Lion, wants to know the best way to handle the ore. It is a blanket vein in a porphyry dike, carrying gold, silver, lead, iron and copper. It is low grade, worth $6 or $7 a ton, and is silicious. It will concentrate six tons into one.

TELLER COUNTY.

(Special Correspondence). — The big snow blockade is a thing of the past. With commendable promptness the roads cleared their lines for business and there has been but a ten days' delay. The smelter situation is still the topic. Much praise is accorded the Guggenheims for their $20 proposition because, while the Pueblo smelter capacity is at present limited, yet the intimation to the trust that they can't run things is too strong to escape their notice, and the general Cripple Creek opinion is that the trust will "come down," or, rather, come up to the Guggenheim offer. The plea that they have to pay more for coke is pretty well discounted by the general knowledge of profits at former rates. The Guggenheims are getting hold of lead-producing properties for flux, and expect to be able to make a stand for good. It is thought that if the smelter trust can be firmly met the mill men can also reduce rates.

Cripple Creek, April 21.

Cripple Creek mine owners who have been supplied with compressed air for running machine drills by outside corporations object to the advance of 50% and talk of putting in their own compressors.

Circular letters from the Philadelphia smelter at Pueblo have been received by mine and sampler managers offering to take Cripple Creek ores at the old rate. Twenty dollars an ounce will be paid for the gold, and a treatment charge on contract ore of from $9 to $10 is offered, and on other ores not under contract an advance of $1 a ton will be charged. It is the general belief that the smelter trust will be compelled to meet this rate, and that the mill owners will also advance the price for gold and reduce the treatment charges. The smelter trust is now paying only $19.50 for gold. This means a loss to the Isabella, Portland, Stratton's Independence and other mines that have been shipping ore that runs all the way from 400 ounces a ton in carload lots.

The Globe Hill Con. G. M. Co. has sold to D. H. Rice, for W. S. Stratton, the Happy Boy, Foggy and Goodenough claims on the west slope of Gold hill for $75,000 cash.

Cripple Creek Times: The new machinery is arriving at the Gold Coin mine, and it is expected that it will be in place and in operation by Sept. 1. Mgr. H. E. Woods states that when the machinery is up the mine will be capable of outputting $450,000 worth of ore per month, or over $5,000,000 a year. It is said that the development in the seventh level of the Gold Coin breaks the record of the wealth in deep mining and makes the Gold Coin the largest claim mine in the district.——M. W. Levy & Co. have bought the Ide lode on Bull hill for $20,000.——Another new ore sampler near Goldfield is to be located on the east slope of Battle mountain, near the National, to be known as the Eagle Gold Ore Sample Co. The cost will be about $18,000.——The Madison G. M. Co. has sold its properties for $35,000 to C. W. Kurie.

IDAHO.

Chas. Sweeney of Spokane has bought the Big Buffalo mine at Buffalo Hump for $200,000.

BOISE COUNTY.

Near Idaho City is a large deposit of gold gravel worked under lease by Ballantyne & White. The bank is 110 feet high and solid gravel. The gravel averages 100 feet in depth; 3200 inches of water are used; three of the giants work under a pressure of 200 feet; four have 3½-inch nozzles. Of the three larger ones, two have 5-inch nozzles and the largest of the three a 7-inch.

IDAHO COUNTY.

George Connors, Supt. Hiyu mine, says the snow is going off rapidly. Preparations are being made to open the Hiyu.

OWYHEE COUNTY.

(Special Correspondence).—The progress of the De Lamar tunnel, being pushed by Supt. D. B. Huntley, for the months of January, February and March, 1900, was 402, 398 and 402 feet, respectively, making the total length April 1st, 2958 feet.

De Lamar, April 19.

MONTANA.

BEAVERHEAD COUNTY.

The Birch Creek C. M. & S. Co. is organized by Butte men to operate the Indian Queen mine, on Birch creek, 12 miles from Dillon; T. Ellis, secretary. A shipment of two carloads to the Colorado smelter at Butte showed 12% copper.

CARBON COUNTY.

At Red Lodge the miners' union has accepted the schedule of wages submitted by the new management of the Rocky Fork coal mines, and the miners will resume work at once. The new schedule gives the men practically all they asked for. The new management will make preparations to double the output of coal, which means employment for 700 men.

MADISON COUNTY.

At the Madisonian mine, near Sheridan, the plant will be increased by the addition of machinery from the property at Leiterville, which was recently abandoned. Supt. Trerise will sink 200 feet farther.

TETON COUNTY.

At Swift Current, A. M. Sessler has selected sites for two 100-ton concentrators, one on the Crocker system of leads, the other on the Bullshead system. Men are at work getting out timbers for the Crocker concentrator, and construction will begin on the arrival of a sawmill. It is expected both concentrators will be finished before Dec. 1. Work on the Josephine began April 20.

NEVADA.

ELKO COUNTY.

Near Wells, at the Contact mines the hoisting plant is in operation and a smelting concern is ready to commence operations as soon as sufficient sulphide ore is produced.

The Starr M. & M. Co., with headquarters at Cherry Creek, employs 150 men and has increased its milling capacity by an additional twenty stamps. A car of concentrates was recently dispatched from Wells, but the bulk of shipments goes by way of Toano, five 12-mule teams being on the road.

From Sprucemount (gold, silver and lead), forty miles south of Wells, a carload a week is the shipment from that point. Mgr. Hartley assesses the average net value of a carload at $1000. He intends to put in a large hoisting engine.

EUREKA COUNTY.

A suit has been filed asking that a receiver be appointed for the Whalen Con. C. M. Co., and that its officers be enjoined from selling or converting any of its stock. The complainants say that defendants have conspired to discredit the company and to depress the value of the stock, so that they could later obtain control of it at a low price.

STOREY COUNTY.

The Truckee River General Electric Co. has been notified by the Westinghouse Co. that the latter will be ready to ship the first of the machinery for the power house at Floriston May 15, and that they expect to ship the remainder before June 4. The company expects to turn on the electric current and supply power to the Comstock mines by Aug. 1.

WHITE PINE COUNTY.

The Salt Lake Tribune reports F. H. Blake and J. H. Marriott as examining the hubnerite deposits at Osceola, at the foot of the west side of Mt. Wheeler. It is shipped to Philadelphia, where it is made into tungstic acid, used in the manufacture of steel. It brings $300 per ton laid down in Philadelphia. The expense of mining is not great, but the haul of 95 miles to Frisco, Utah, is.

NEW MEXICO.

GRANT COUNTY.

The San Jose Concentrating Co., at Gold gulch, has its mill completed.

SANTA FE COUNTY.

The experimental gold saving plant at Dolores, on the Ortiz mine grant, is nearing completion and it is expected will be started up next week.

SOCORRO COUNTY.

Sixteen men are employed on the Cooney mine at Mogollon.

The Kat and Kittens Co. at Mogollon has completed a run of 300 tons of ore which went $20 per ton in gold and silver.

The Last Chance Co. at Mogollon is running a crosscut tunnel. New machinery will be placed in the old mill.

TAOS COUNTY.

Wm. Brandreth of 71 Broadway, New York City, has selected a site at Amizette for a 40-stamp mill. He also plans a power plant there and says he will build a custom mill in addition to the 40-stamp mill.

OREGON.

BAKER COUNTY.

The Buffalo G. M. Co. has recently incorporated at Sumpter. The incorporators are F. A. Williamson, A. Mohr, W. Finn, W. H. Emes, M. G. Haskell; capital stock $100,000.

JOSEPHINE COUNTY.

The Harris gold dredger, eight miles from Waldo, is dredging 200 acres lying along the Illinois river, daily handling 1000 cubic yards gravel.

Mgr. Jno. Wickham of the Big Yank M. & M. Co. of Galice has a property yielding copper, with traces of gold. The copper runs 8½% and the silver about $1.75 a ton. He intends to put in a smelter.

GRANT COUNTY.

W. L. Vinson and T. K. Muir failed to meet their last payment on the Magnolia mine; the property has reverted to its original owners. The purchase price of the Magnolia, which was operated by Vinson and Muir for an English syndicate, was $25,000. Over half of this amount is said to have been paid. The mill erected by the purchasers cost $25,000, and other improvements about $25,000 more. For a time the mill was operated successfully, but later about two-thirds of the values were lost through unsuccessful methods of ore treatment.

SOUTH DAKOTA.

CUSTER COUNTY.

At Custer City the Chicago Mica M. Co. has a mica grinding mill of ten tons daily capacity. The company expects to ship three carloads per month.

UTAH.

BEAVER COUNTY.

(See Illustration front page.)

(Special Correspondence).— The Horn Silver is the historic mine of this section. It was opened nearly thirty years ago, since which it has produced over $30,000,000. The location is in a low range of trachyte and dolomite lime and is reached by the Oregon Short Line, a spur of which runs from Milford to Frisco, 17 miles distant. On page 457 is presented an illustration which conveys some ideas of the surface improvements and the general appearance of the country.

The Horn Silver ledge runs north and south and stands in a nearly vertical position. One main shaft sinks 1600 feet vertically, from which crosscuts run westward about 100 feet to the vein. There are stations at the 300, 500, 700 and 900, and at each 100-foot level below the ninth. The 1600-foot station is at the water level, below which is a sump, from which several thousand gallons of water are bailed each day.

The ledge, from wall to wall, is from 30 to 100 feet wide and is opened about 3000 feet on the strike. On the seventh a drift runs northward from the shaft 2260 feet. The first workings were in an open cut along the outcrop. Some thirteen years ago a cave-in occurred, extending from the surface to the seventh level, and lengthwise several hundred feet, filling the stopes and drifts with a conglomerate mass of ore, waste and crushed timbers, grinding much of the siliceous material to a flour fineness. Much of the work of recent years has been directed to cleaning out the caved-in chambers and stopes, sorting the ore therefrom, retimbering in places and filling in the ground as it is worked over. This work proceeds from four to six sets high, the conditions requiring the heaviest and most thorough timbering. Below the seventh level the work goes on regularly, the stoped-out places being filled in from above and the timbers removed to a large extent. Ore is being taken from every level from the the surface down, excepting the sixteenth, where only development is in progress.

The ores from the surface to the seventh are largely lead carbonates, carrying also silver, gold, copper and zinc. At greater depth they become more of a copper and zinc sulphide, with considerable galena. In the upper workings a large tonnage of silver chlorides (horn silver) was obtained, from which the mine derived its name.

The report of the company for the year ending December 31, 1899, shows:

Sales of ore and concentrates		$217,204
Store at Frisco		15,000
Interest and rentals		2,815
Total receipts		$235,019
Mive expenses	$140,791	
Mill expenses	35,240	
General expenses	32,706	
Suspense account	699	
		209,436
Profit for the year		$ 25,583
Dividend No. 43 of 5c a share		20,000
Balance		$ 5,583
Brought forward from 1898		163,736
Surplus January 1, 1900		$169,319

The ore extracted and shipped and the

average values per ton of ore shipped were as follows, in gross tons:

	Ore mined.	Ore ship'd.	Value.
First class crude ore..	2,299	2,299	$20.17
Second class crude ore	1,010	1,010	9.92
First class copper ore.	1,612	1,612	45.45
Concentrating ore....	27,728	.....	.....
Concentrates	.....	3,581	26.47
Totals	32,649	8,502	$25.55

The total value of the ore shipped was $217,204. The cost of mining was $140,791, of concentration $35,240. The cost of mining per ton was: Labor on ore, $1.87; labor on dead work, $0.50; labor on surface, $0.70; supplies, timber, fuel, etc., $1.24; total, $4.31 per ton. The cost of concentration was $35,240, the cost per ton of crude ore being: Labor, $0.80; supplies, fuel, etc., $0.47; total, $1.27. The average concentration was 7.74 tons into 1 ton.

The products of the ore mined included 4,576,952 pounds lead, 717,120 pounds copper, 192,116 ounces silver and 310 ounces gold. The ore hoisted was 40,501 pit carloads; the ore shipped was 338 railroad carloads. Supplies used included 677,629 feet timber, 2583 poles, 2036 tons coal, 3344 cords wood and 339 tanks water.

The dead work performed included 825 feet drifting, of which 542 feet was on the 1100 level and 283 feet on the 1600 level.

Mgr. Farnsworth's report says: "In extending the drift north from the crosscut on the 1600 level about December 1, when out a distance of 160 feet, we encountered a flow of water of 20,000 gallons per day, which we use in the mill for ore concentration. No difficulty or inconvenience is experienced is raising this water to the surface, as we are well provided with tanks handled by the engine. Owing to the excessive drought which has prevailed for over a year the water supply became very much reduced, and we were unable to treat the usual amount of ore in the mill. That difficulty is now entirely overcome. No ore has yet been found on this level, although all indications point to the presence of copper. On the 1100-foot level the drift has been extended 542 feet, which is still in low-grade copper ore. None, however, has been found that will pay for handling in any way. The copper product, as shown in this report, is taken from the 700 and 800 levels. So far as we can determine now the output for the coming year will be much the same as that just closed. There are no important developments to report from any of the other levels. All are in excellent condition. The net profit from the mercantile business was $16,056, $15,000 of which will be turned over to the treasurer. The balance—$1056—will be used in reducing values of real estate, etc."

The mill, though not distinctly shown in the illustration, is equipped with thirty stamps, crushers, fine rolls, jigs and vanners, by which about 150 tons per day are reduced to 20 to 25 tons of concentrates. Six vanners receive the lead carbonates, while twelve others handle the zinc-lead sulphides. The ores cantaining the copper carbonates and copper sulphides are usually of high grade and are shipped direct to the smelter. The crude ores shipped run from 25% to 40% lead, 20% to 40% copper. The concentrates shipped run from 35% to 50% lead and thirty-five to forty ounces silver. The zinciferous ores are of importance here. They run as high as 45% in that metal. A shipment of 500 tons was recently made by way of Galveston, Texas, to Germany. The crude ore shipments to the smelter amount to 800 to 1000 tons per month. The gold values run from .4 to .6 ounce to the ton in the high-grade ore.

A feature of the power house is a heater and purifier, which precipitate the calcareous and other elements in the water before it passes to the boilers. It was devised by J. B. Fleming, now in charge of the Silver King mill at Park City. The plant includes a duplex compressor of twenty drills capacity. The mill tailings are impounded for some possible leaching process in the future. Settling vats are provided to secure the water, which is used over and over again. A force of 160 men is employed at mine and mill. P. T. Farnsworth, Salt Lake City, is Gen. Mgr. On the ground Josiah Osborne is mine Supt., with Mr. Richards in charge of the mill. A half mile from the mine is the old smelter, which ran most of the time from '70 to '80. WASCOTT.

Frisco, March 1.

SALT LAKE COUNTY.

E. W. Genter has sued the Conglomerate M. Co. for $10,000, alleged to be due for commission for negotiating a sale of the mining properties of the defendant at Bingham. He alleged that on February 3, 1899, he was employed by the defendants to procure a purchaser for the property, and that they agreed to pay him $10,000 for such service. Through his efforts, he said, the property was sold to C. A. Hight of Boston for $550,000, but plaintiff has not received his remuneration. The negotiations between Genter and the company were conducted by G. Lavagnino, as manager of the company, and the latter, for defense, alleged that Lavagnino had no authority to make such an arrangement on its behalf. Lavagnino alleges that the arrangement with Genter was that the buyer should pay him a commission of $50,000, half of which Lavagnino was to get. He then alleges that Genter, on that head, owes him $25,000, and prays for judgment for that sum.

JUAB COUNTY.

J. J. Watson, Supt. Eureka Hill mine, expects to resume operations about June 1st and to have the sixty stamps there at work. There are about 12,000 tons of ore on the dump. It is expected that at the mine and mill 250 men will be employed.

The Tintic Miner hears that the Sunbeam M. Co. will resume work by Sept. 1st under the direction of T. G. Weber of Park City. To the present plant will be added a new boiler.

WASHINGTON.

SNOHOMISH COUNTY.

Mr. Crooker, J. D. Rockefeller's representative, says that the Everett & Monte Cristo Railway will be rebuilt to Monte Cristo by June 1, and the Pride and Mystery mines again made productive. The cost of rebuilding the road is estimated at $50,000, and the statement is made that when it is completed 300 men will be employed in the mines.

WYOMING.

CARBON COUNTY.

A strike is reported in the Mohawk gold mine at Gold Hill, 25 miles from Saratoga, where rich ore has created interest in southern Wyoming and northern Colorado.

FOREIGN.

BRITISH COLUMBIA.

(Special Correspondence). — Since the purchase of the Golden Cache property by the Toronto-Lillooet Gold Reefs Co., Ltd., that corporation has also acquired eight other mines adjoining. Gen. Supt. Rives is furnishing a large cyanide mill, the only one in the province, and has put in a mile of tramway. The ore is dried before crushing and rolls will be used instead of stamps. The company is entirely Canadian, with head office at Toronto.

Lillooet, April 20.

Nelson Tribune: During 1899, the Hall Mines smelter at Nelson produced 5390 ounces of gold, 672,706 ounces of silver, 1,508,786 pounds of copper, and 2,090,550 pounds of lead. The Canadian Pacific smelter at Trail produced during the same time 52,218 ounces of gold, 101,419 ounces of silver, and 2,578,717 pounds of copper. The value of this gold, silver, copper and lead was approximately $2,500,000, or about one-third of the total value of the gold, silver, copper and lead ores mined in Kootenay and Yale districts.

MEXICO.

Paco Garcia has sold to Thomas McCraw of New York the Picach de Bacanuchi mine, near Bacanuchi, in the Arizpe district, Sonora, for $150,000 in gold. The new owner will erect a mill and work the property.

Specimens of platinum have been received in the City of Mexico from placer mines in Sonora.

The reported sale of the Cecil Rhodes group of mines in Zacualpan district is denied by the London Bank, which, according to a report wired from the City of Mexico, was handling the business for Rhodes. The price was put at $4,000,000 gold.

THE KLONDIKE.

The receipts at mints, assay offices, private refineries and smelters for the calendar year 1899 from the Northwest Territory (Klondike) were $15,986,627 gold and $267,390 silver, a total of $16,254,107, an advance in output of $5,028,198.

Yukon hydraulic mining regulations have been amended so that any person who files an application in the Department of the Interior for a location previously prospected by him, or his authorized agent at the time the location was prospected, a lease will be issued, provided he is the first qualified applicant therefor. Before the issue of any such lease there shall be filed in the Department of the Interior at Ottawa a report from the gold commissioner to the effect that it has been proved to his satisfaction that the applicant himself, or a person acting for him, was upon and actually prospected prior to the date of the application, that ground included in the location is not being worked and is not suitable to be worked under the regulations governing placer mining.

Personal.

C. A. DONNELSON is Supt. Tubah mine, Panamint, Cal.

A. M. RUCKER succeeds J. L. Eby as foreman Bessie mine, Telluride, Colo.

CURTIS H. LINDLEY has returned to San Francisco from Washington, D. C.

W. W. HOLLAND succeeds J. W. Brown as Supt. Temescal mine, Tuolumne county, Cal.

F. R. ROBBINS, formerly of California, is now Mgr. North Star mine, British Columbia.

J. L. GIROUX, Supt. United Verde, Arizona, has returned from Sonora, Mexico.

G. T. MILNER is Supt. Zonia Copper Co. and Del Norte Copper Co., near Prescott, Ariz.

J. W. NEILL has resigned his position as Mgr. United States M. Co.'s mines at Bingham, Utah.

C. J. GRAHAM will superintend the operations of the Latauy Bay, Alaska, Placer M. Co. this summer.

WALTER PENNELL has charge at Mokelumne Hill, Cal., of the operations of the Standard Electric Co. at that place.

THE Trade Dollar Con. M. Co. has presented the general manager, Jas. Hutchinson, with a residence in Boise, Idaho.

GEO. S. KEAVINGTON is Supt. Mellin M. Co., Seward City, Alaska, and has begun the season's work with thirty men.

DR. CABEL WHITEHEAD, assayer of the Mint Bureau of the Treasury, has gone to Cape Nome to make report on conditions there.

J. A. FILCHER writes from Paris that the California State exhibit arrived in good shape, but few breakages having occurred.

HORACE F. BROWN, M. E., of Chicago has returned to San Francisco from an inspection of mining property at Sumpter, Or.

R. H. POSTLETHWAITE has returned to San Francisco from Oroville, Cal. Two of his gold dredgers are now operated by electricity.

SUPT. R. H. TRUMAN of the Ray mines, Arizona, and A. Hill of the London Exploration Co., have returned to the property from San Francisco.

H. A. COHEN is in Salt Lake City, Utah, engaged upon a report to determine the basis on which the Mercur-Golden Gate consolidation is to be made.

E. H. MEEK has resigned from the employ of the United Verde Copper Co., Arizona. He is now Gen. Mgr. Jerome, Ariz., Copper Co., and is at Oak creek to take charge of affairs.

ON the 18th inst. Gen. Mgr. Dickinson, Pres. Burt, E. H. Harriman and Jacob Schieff of the Union Pacific R. R. rode from Grand Island to Omaha—153 miles—in 152 minutes, making one stop. The time for 516 miles, Cheyenne to Omaha, was 10 hours 50 minutes. Gen. Mgr. Dickinson is now in San Francisco.

Industrial Notes.

—Consul-General Patterson writes from Calcutta: "I am constantly receiving letters regarding the manufactures of the United States, inquiring how such manufactures can be produced, and requesting to be put in communication with our exporters. The imports into India last year amounted to about $270,000,000, and this is the great distributing point. The National Association of Manufacturers of the United States is doing efficient and practical work in the way of extending the foreign work of the United States by establishing warehouses at Caracas, Venezuela, and Shanghai, China, for the display and sale of goods made by members of the association. I have no doubt that if such a warehouse were established in Calcutta, with agents authorized to make sales, a very large trade would result."

—W. P. Wilson writes: "I take pleasure in enclosing you herewith a pamphlet just prepared by the Philadelphia Commercial Museum, covering the conversion of United States weights and measures and moneys into foreign weights and measures and moneys. This information has been prepared especially for the American manufacturer seeking export trade. As the metric system in exporting to most countries is absolutely necessary, it has occurred to us that you might find use for the pamphlet, and might care to give it mention in your columns, inasmuch as it is being distributed to American manufacturers without cost, and in furtherance of the work of the institution, which is solely that of fostering American export trade." The pamphlet gives valuable information in a convenient form. Every manufacturer might well have one on his desk.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING APRIL 17, 1900.

647,714.—SNAP HOOK — G. L. Baker, Waterford, Cal.
647,552.—FURNACE—C. H. Bennett, Los Angeles, Cal.
647,595.—POULTRY ROOST—C. Burrows, Phœnix, Ariz.
647,895.—URINAL—E. E. Burson, Los Angeles, Cal.
647,806.—NUT LOCK—G. W. Cleveland, Little Rock, Wash.
647,671.—DOOR CONTROLLER—M. A. De Lew, Sacramento, Cal.
647,651.—GAS ENGINE—W. R. Dow, Boulder Creek, Cal.
647,816.—MOLDING MACHINE—J. C. Dressel, Fresno, Cal.
647,745.—LAMP—Eldridge & Smith, Stockton, Cal.
647,828.—WEEDING MACHINE—F. S. Gunning, Dalles, Or.
647,658.—BUTTER CAN—J. A. Hall, S. F.
647,921.—SQUARE, LEVEL, ETC.—E. W. Hutchinson, S. F.
647,841.—INK WELL HOLDER — F. D. Jones, Los Angeles, Cal.
647,722.—TOBACCO PIPE—W. B. Kennell, Tacoma, Wash.
647,845.—FIRE ESCAPE—A. J. King, Orcas, Wash.
647,504.—PIPE BOILER—W. MacFarlane, Seattle, Wash.
647,605.—REAMER—C. A. Mentry, Newhall, Cal.
647,678.—CHARGING LEACHING VATS—C. W. Merrill, Alameda, Cal.
647,682.—FILTER—R. C. Reed, S. F.
647,532.—FRUIT CORER — D. E. Sharp, Los Gatos, Cal.
647,685.—PIPE WRENCH—J. Stewart, Ft. Defiance, Ariz.
647,618.—GAS GENERATOR—A. C. Swain, S. F.
647,620.—RAILWAY CHAIR—E. F. Taylor, Azusa, Cal.
647,638.—WAVE MOTOR—G. N. Todd, Los Angeles, Cal.
647,772.—TOWEL MOISTENER—Townsend & Shelby, Watsonville, Cal.
647,711.—COMB FOUNDATION—H. Vogeler, Newcastle, Cal.
32,540.—DESIGN—G. M. Light, Pomeroy, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SPRING CLAMPS FOR BILLS OR ACCOUNTS.—A. W. Thierkoff, Redding, Cal. No. 646,510. Dated April 3, 1900. This device comprises an improved clamp for holding bills upon a cylinder drum described in a former patent. It consists of one or more clamps with a spiral spring and bail connection which forms an elastic movable fulcrum, so that either or both clamps can be lifted for the purpose of inserting or removing papers, and both clamps are held down by the action of the spiral spring.

GRINDING AND POLISHING WHEELS AND MOUNTINGS.—No. 647,063; April 10, 1900. James H. Adamson, West Melbourne, Victoria. This invention is designed as an improvement for cutting, grinding or polishing wheels and the mounting thereof, such as emery, tanite, corundum, or any grinding or cutting wheels of a material which has a tendency to disintegrate when running at a high speed. The object of this invention is to provide mountings for such wheels by which they are reinforced and clamped together by the use of casings made of steel, iron or other material having greater strength and in so arranging such clamped devices that new surfaces of the wheel proper may be exposed as fast as it becomes worn.

SELF-CLEANING FILTERS.—No. 647,682; April 17, 1900. R. C. Reed, San Francisco, Cal. Two-thirds assigned to H. Zadig and M. Blum, of same place. This invention has for its object such a construction of filter that unfiltered water can be drawn directly through the apparatus or the water may be filtered and stored for use, and the flow of water through the filter may be reversed in conjunction with a direct cleansing flow over the surface to be cleaned. The filter includes a tubular filtering medium, an inclosing case therefor, a spiral passage formed about and removable with the filter surface and along which the water flows to automatically cleanse said surface, and means for admitting water to and discharging it from said passage.

Latest Market Reports.

SAN FRANCISCO, April 26, 1900.

SILVER—Per oz., Troy: London, 27⅛d (standard ounce, 925 fine); New York, bar silver, 59¾c (1000 fine); San Francisco, 59¾c; Mexican dollars, 49c.

COPPER.—New York: Lake, 1 to 3 casks, 17.50 cash; carload lots, 17.25; Electrolytic, 1 to 3 casks, 17.25; carload lots, 17.00; Casting, 1 to 3 casks, 17.00; carload lots, 16.75. San Francisco: 17½@18. Mill copper plates, 21½c; bars, 23½@25c.

LEAD.—New York, $4.70; St. Louis, $4.60; San Francisco 5c, carload lots, 5½c, 1000 to 4000 lbs.; pipe 7½, sheet 8¾, bar 7c. London, Soft Spanish Lead, £17 = 3.70c per lb.

SPELTER. — New York, $4.80; St. Louis, $4.75; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 50@55c ℔ lb.

IRON. — Pittsburg, pig, No. 2, foundry, $23, gray forge, $21.50; San Francisco, bar, per lb., 3½c.

STEEL.—Billets, Pittsburg, $33; sheet bars, $37; San Francisco, bar, 12c to 20c per lb. Pittsburg wires two sharp cuts in iron and steel products have been made. Foundry pig iron, No. 2, offered at $19.50 a ton for early delivery. This is a cut of $3. Quotations on this product have been higher, but it has been possible for some time to get it at Pittsburg for $22.50. Open-hearth billets have been reduced from $40 and $42 a ton to $38 and $40. It was reported that a cut of $5 a ton in Bessemer pig had been made, but this lacks confirmation. While the price of Bessemer is $33, it is said that large contracts can be placed at $32.50.

QUICKSILVER. — New York, $52.00; London, £9 12s 6d; San Francisco, local, $51.50 ℔ flask of 76½ lbs. Export rates withdrawn.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

TUNGSTEN.—New York, ℔ lb., $1; San Francisco, $1.25.

FERRO-TUNGSTEN.—New York, 37c, 40c; San Francisco, 75c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, $125.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

TIN.—New York, pig, $31.25; San Francisco, ton lots, 34c; 1000 lbs., 34½c; 500 lbs., 35c; less, 36c; bar tin, ℔ lb, 40c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

NICKEL.—New York, 45@50c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.70 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ℔ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 33@35c ℔ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 2½c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1⅞@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $7.00; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50.

SOLDER. — Half-and-half, 100-lb. lots, 21½c; San Francisco, Plumbers', 100-lb. lots, 18½c.

San Francisco Stock Board Sales.

SAN FRANCISCO, April 26, 1900.

9:30 A. M. SESSION.

200 Challenge...17c	100 Sierra Nev...41c
50 Mexican.....29c	800 Silver Hill...15c
100 Overman....23c	100 St. Louis....12c
600.....24c	100 Y Jacket....25c

2:30 P. M. SESSION.

1200 Ophir.....60c	1000 Potosi.....25c
400 Mexican.....32c	200 Y. Jacket...25c
100 G. & C.....25c	300 Overman....25c
200 B. & B.....20c	100 Justice.....03c
500 C. C. & V.$1 55	100 Caledonia..$1 50
800 Savage.....08c	100 Challenge....18c
600 Chollar.....23c	100 Occidental...09c

Commercial Paragraphs.

H. KNOX AND C. H. GRAY of San Leandro, Cal., go to Cape Nome with a gasoline engine from The Daniel Best Mfg. Co. of San Leandro.

THE concentration of the tailings at the chlorination plants which run on Cripple Creek ores has become a saving factor of some importance. The National, El Paso and Gillett mills operate Wilfley tables for this purpose. The high degree of concentration effected is represented by the ratio of 100 and 150 to 1. As a general proposition these tailings run not less than $1 per ton, and in many cases much higher. It is figured that the concentrators save at least 50% of those values. In most cases the concentrators are operated as a part of the mill, but in one or two cases the tailings are worked in a separate plant by lessees, who pay a royalty.

Recently Declared Mining Dividends.

Boston & Montana M. Co., Montana, $5 per share and extra dividend of $5 per share.....	May 29
Gold King M. Co., Colorado, 3 cents per share, $30,000.....	April 20
Boston G. C. S. Co., 2½%.....	May 1
Buffalo Hump M. Co., Idaho, 1%.	May 1
Homestake M. Co., South Dakota, 25 cents for March and extra 25 cents.....	April 25
Home M. Co., Leadville, Colo., 100% on its capital stock of $50,000.....	May 1
Iowa G. M. Co., Silverton, Colo., 1 cent per share, $16,667.....	April 14
Gold Coin G. M. Co., Victor, Colo., 2 cents per share, $20,000.	April 25
Con. G. M. Co., Victor, Colo., $10,000.....	April 25
La Bufa M. Co., Sonora, Mexico, $500 per share.....	April 1
International Zinc Co., 1%.....	May 1

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: **EDWARD N. BREITUNG,**
MARQUETTE, MICH.

Quicksilver

——FOR SALE BY——
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET, SAN FRANCISCO.



WE MAKE TO ORDER
Buggy Tops, Cushions, Carriage Tops, Lazy Backs, Canopy Tops, Storm Aprons, Wagon Tops, Dust Hoods, Dashes, Fenders.
Old Tops, Dashes and Fenders re-covered if sent to us. We sell Trimming Material of all kinds, also Top Dressing. Chamois Skins, Sponges, etc Write for Prices and How to Measure. CALIFORNIA TOP CO., 222 Miss on Street, San Francisco, Cal.

AMERICAN AND FOREIGN TRADE MARKS
SCIENTIFIC PATENT PRESS AGENCY
PATENTS
CAVEATS
DEWEY, STRONG & CO. 330 MARKET ST.

SITUATIONS WANTED.

ASSAYER, ANALYTICAL CHEMIST AND SURVEYOR,
with considerable experience in silver-plating mill plates, desires position. Best of reference furnished. Address A. B. C., this office.

WANTED, POSITION AS SUPERINTENDENT.
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Proprietors.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from the Red Dog Mining Company and South Yuba Water Company, in the Red Dog Mine, near You Bet Station, Nevada Co., to deposit tailings in Greenhorn Creek; from Martin Klein, in the Bowlder Hill Mine, near Placerville, El Dorado Co., to deposit tailings in a ravine below the mine; from G. E. Volmer, in the Little Klondyke Placer Mine, near Placerville, El Dorado Co., to deposit tailings in Coon Hollow Creek; and from E. W. Hayden, in the Bluff Placer Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in a ravine below the mine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on April 30, 1900, at 1:30 P. M.

ANNUAL MEETING OF STOCKHOLDERS.

In accordance with the by-laws of that company, the Regular Annual Meeting of the Stockholders of the Jamison Mining Company will be held at the office of the company, Room 64, 120 Sutter St., San Francisco, California, on Monday, the 21st day of May, 1900, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. Transfer books will close on Saturday, the 19th day of May, 1900, at 12 o'clock M. and open again at 10 o'clock A. M. on Tuesday, the 22nd day of May, 1900.
SAM. W. CHEYNEY, Secretary.
Office—Rooms 64 and 59, 120 Sutter St., San Francisco, California.

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Gold Placer Ground (U. S. Patent) in Western States.—The owners of a well-tested property of about 400 acres, suitable for working by dredging, being unable to work same themselves, invite full investigation with a view to sale of the whole or an interest. Reply K. B. C., Mining and Scientific Press.

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A Developed Copper Property.
A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.
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For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

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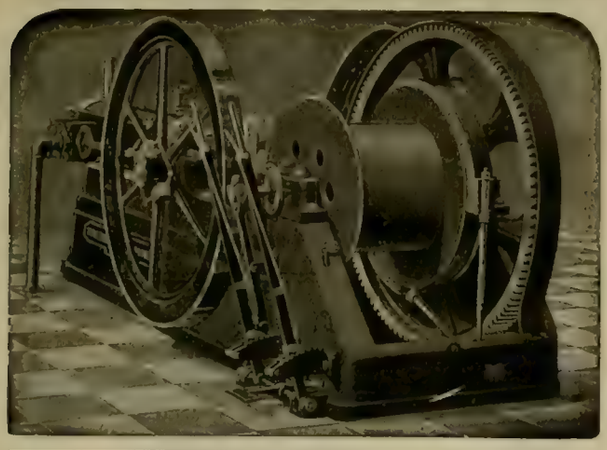
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The undersigned, owner of seven gold quartz mines—from 3 to 20-foot ledges of about $8 ore; ore works by cyanide process; mines developed by five prospect shafts from 70 to 150 feet in depth; 1000 tons quartz on dumps and about 100,000 tons in sight near the surface; ten ore shoots from 200 to 400 feet in length, two of free gold, $10 per ton; 140 assays from $2 to $80 per ton; abundance of timber at the mines; water for mill plant from 7 to 10 miles below mines, in a flat; roads to said flat and all the mines; mines 90 miles distant from Candelaria, Carson & Colorado Railroad station; mines situated in southeastern part of Esmeralda county, Nevada—will give one-half interest in said mines to parties who will erect a cyanide mill plant capable of working 100 tons per twenty-four hours, also equip mines with hoisting works and extend developments 1000 feet. Selling price $190,000. Parties desiring to examine property notify A. P Anderson, proprietor Brilliant gold mines, Oriental, Esmeralda county, Nevada. Routes to reach: via Carson City, Hawthorne, Candelaria, Silver Peak, Lida, Oriental, or Big Pine, Cal., Gilbert's Ranch, Piper's Ranch, Lida, Oriental, Nevada.

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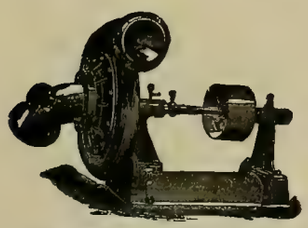
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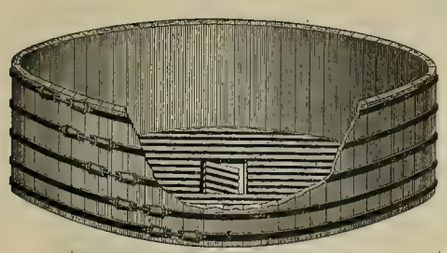
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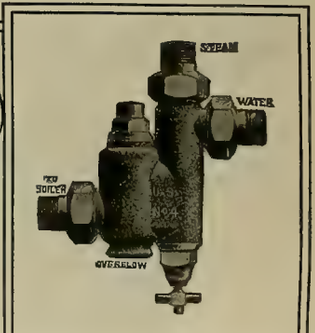
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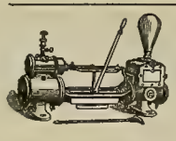
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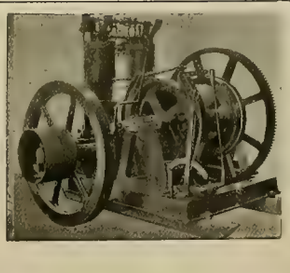
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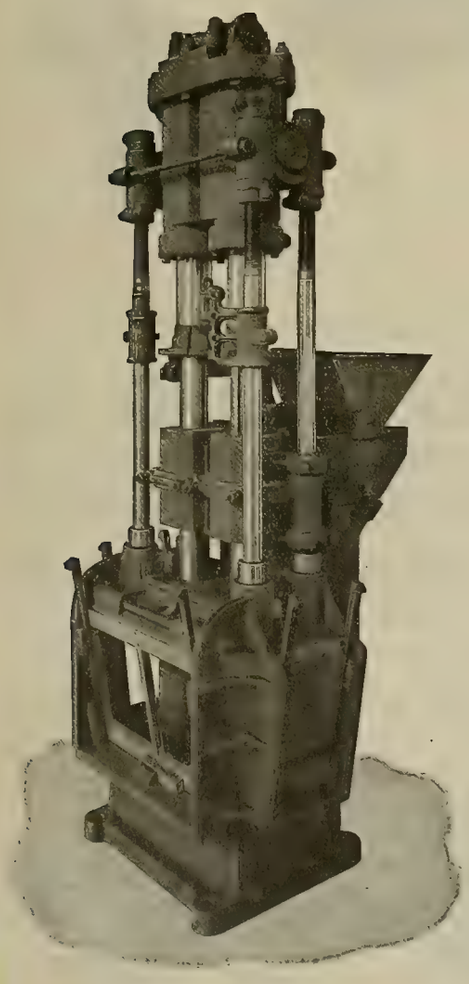
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MY DEAR SIRS:—

Replying to your letter of the 17th inst., asking what we have done with the Tremain Mill at the Storm Cloud Gold Mines near Prescott, Arizona, in the past year, will say that we have been unable to run the Mill more than three days out of the week, owing to the fact that we have had, during the past year, but little rain. We were obliged to use settling tanks and save what little water we had, in order to run three days per week. The Mill has worked splendidly—in fact, it is a perfect little giant to do business with, where you have plenty of water for amalgamating purposes.

Enclosed I hand you a statement amounting to $20,210.72, which is the total product of the Mill for the twelve months, giving dates that we sent the bars to the mint at San Francisco and the amount we received for each bar.

I think the Tremain Mill is the best friend that a prospector or an individual who has practically a good mine can get hold of, to furnish him money to develop his property. I bought the Storm Cloud Gold Mines the last of June in 1897. In the fall of that year I bought, as you know, one of your Tremain Mills. From the day I started it it has paid all my developing expenses, and from the report made by the geologist of Arizona, December last, I now have $940,000 of ore blocked out, the expense of which has been paid from the net proceeds of the Tremain Mill. I have paid for over 1800 feet of development work with this Mill since I erected it two years ago last October. My experience teaches me that if anyone has any trouble with the Tremain Mill it is the fault of the man who operates it.

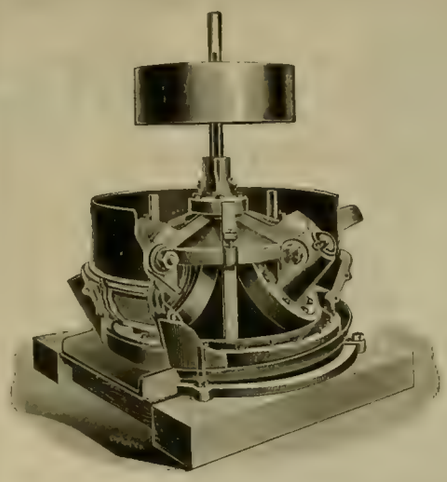
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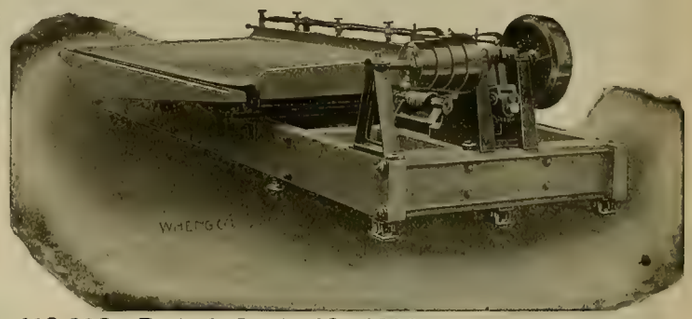
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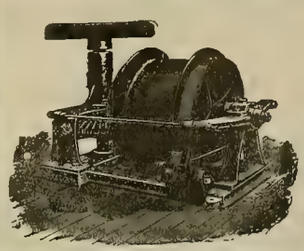
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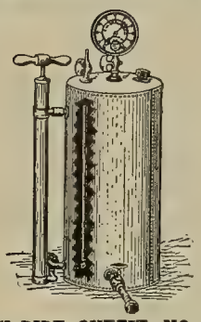
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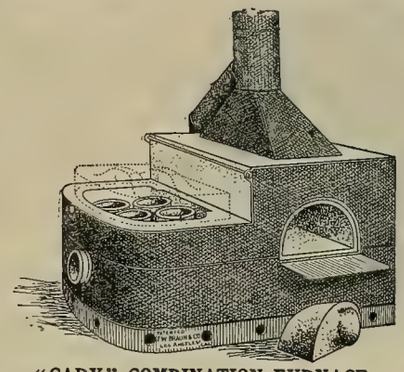
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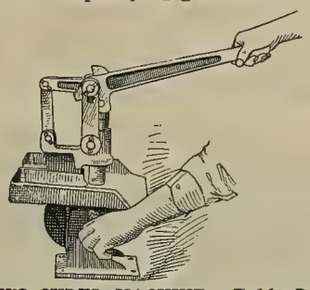
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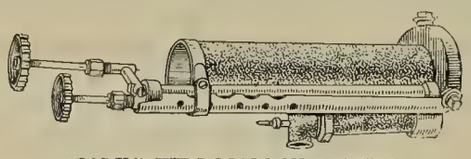
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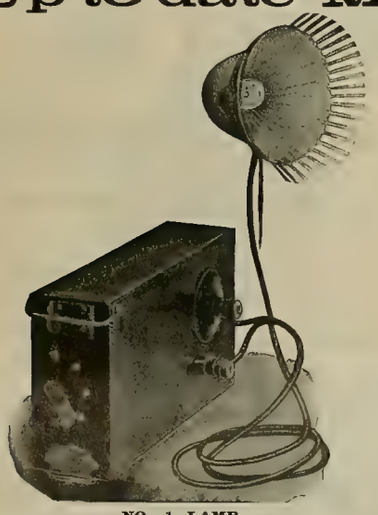
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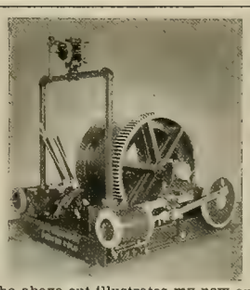
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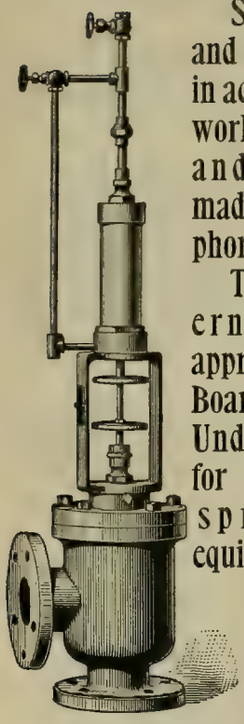
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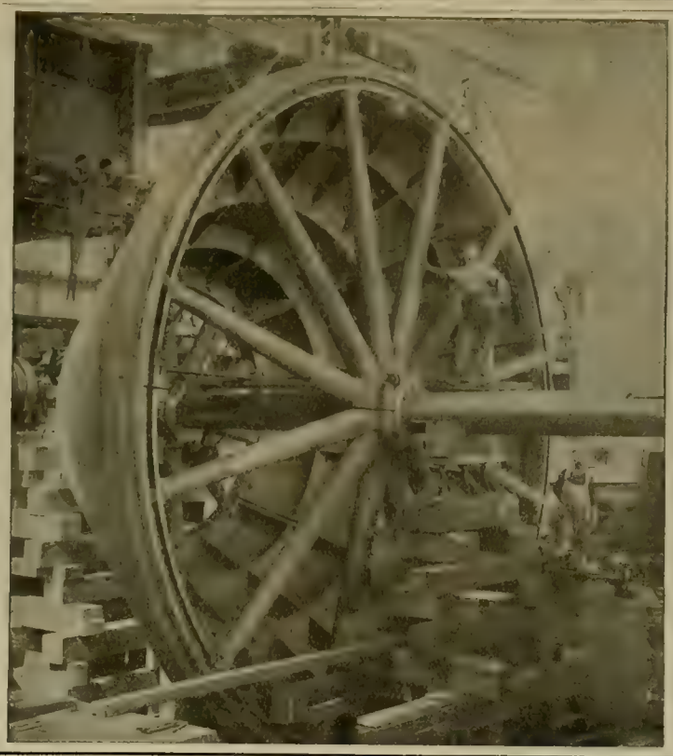
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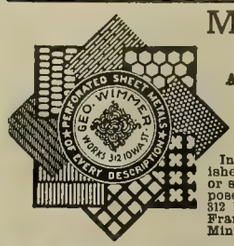
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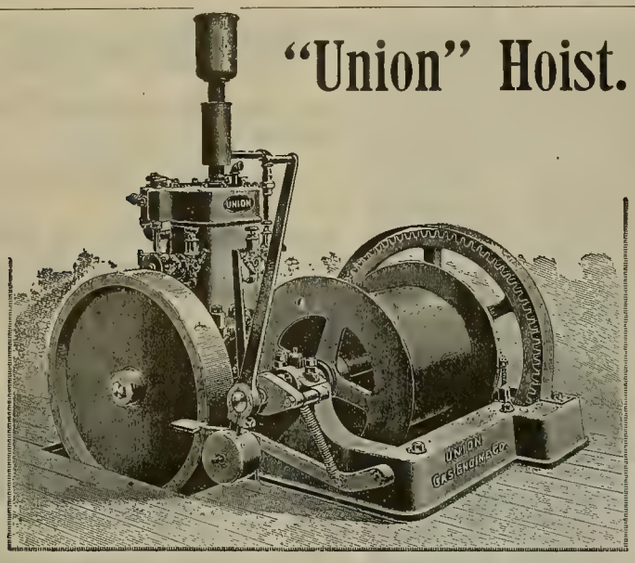
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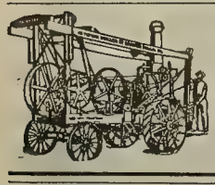
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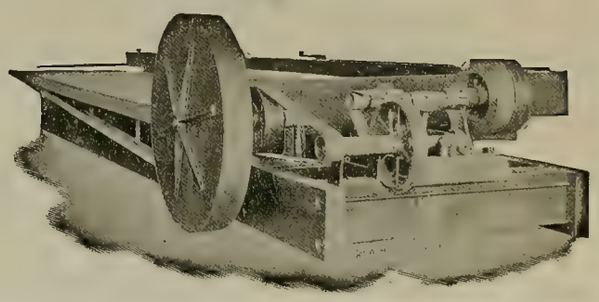
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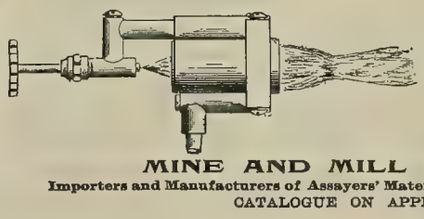
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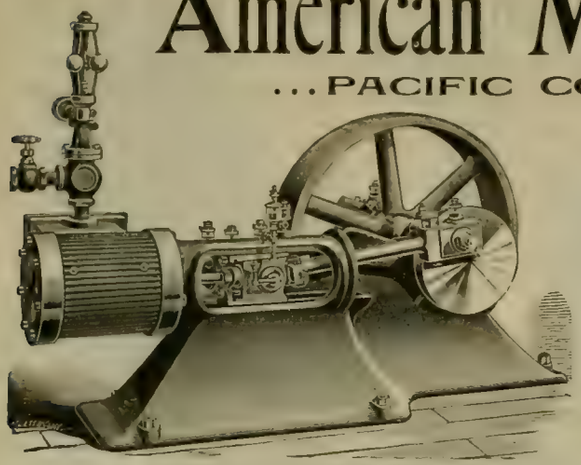
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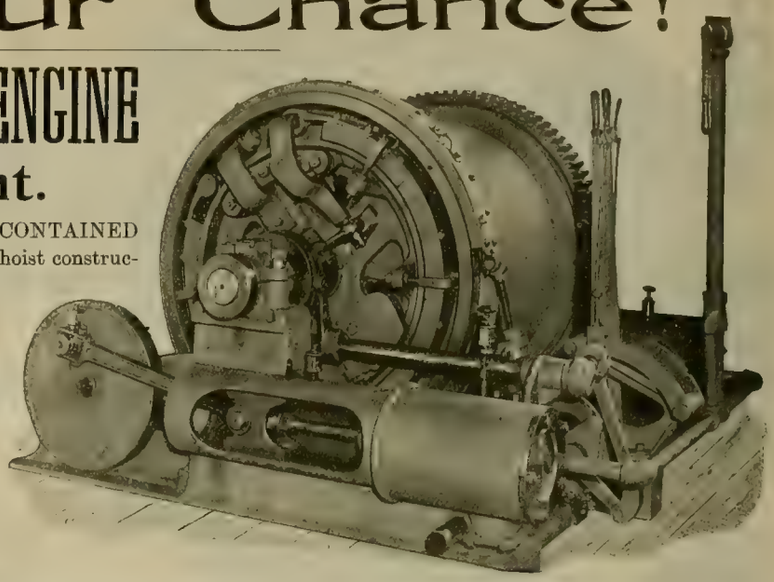
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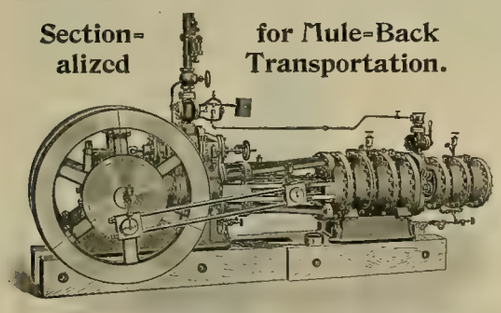


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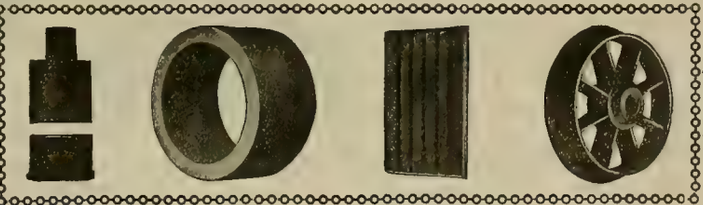
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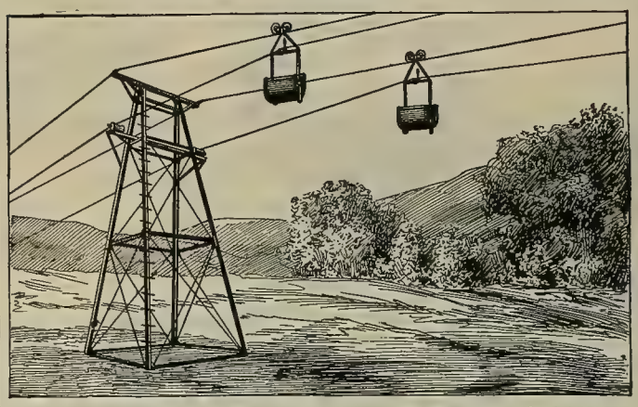
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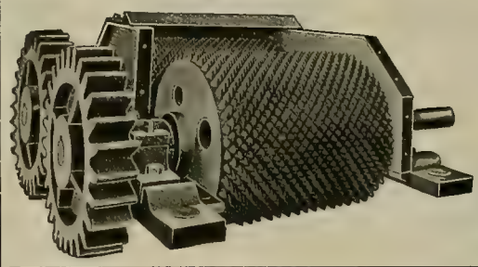


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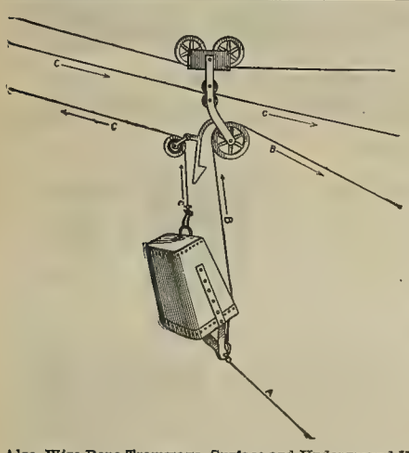
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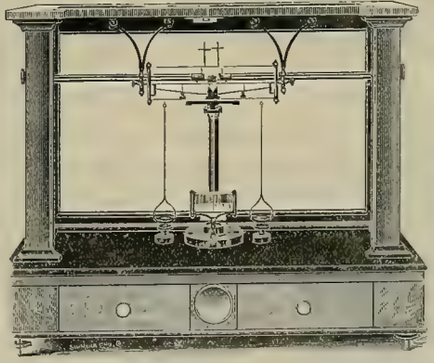
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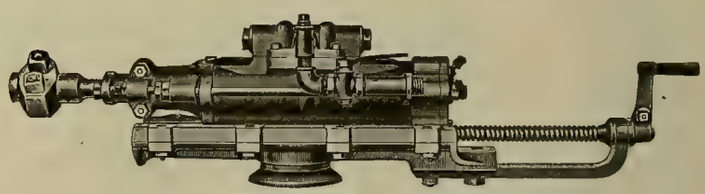
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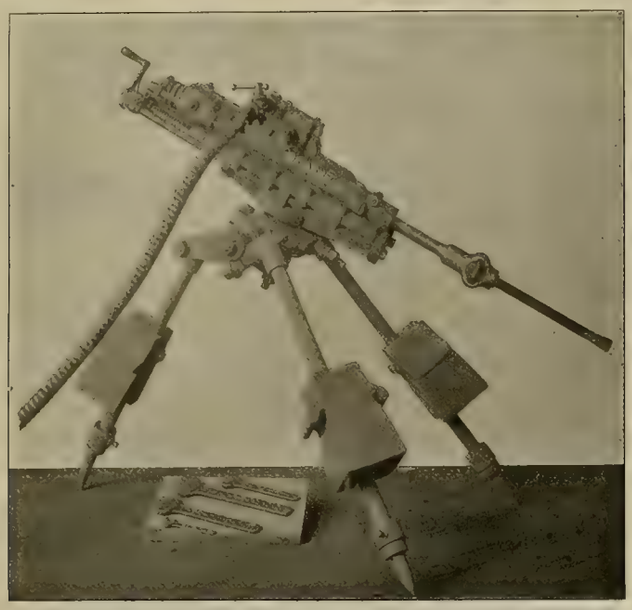
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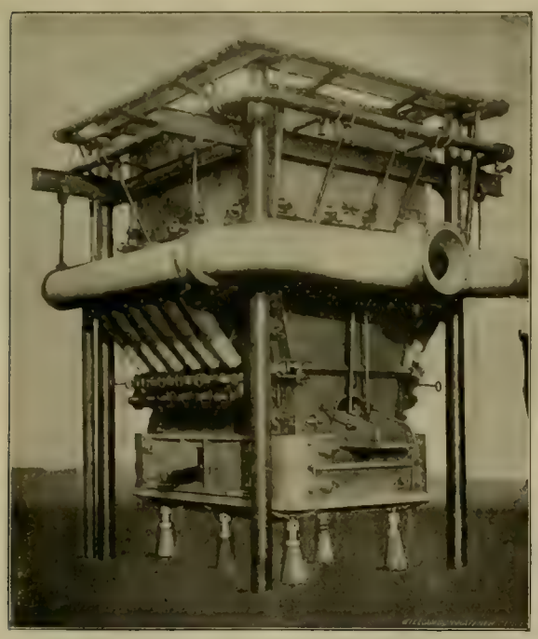
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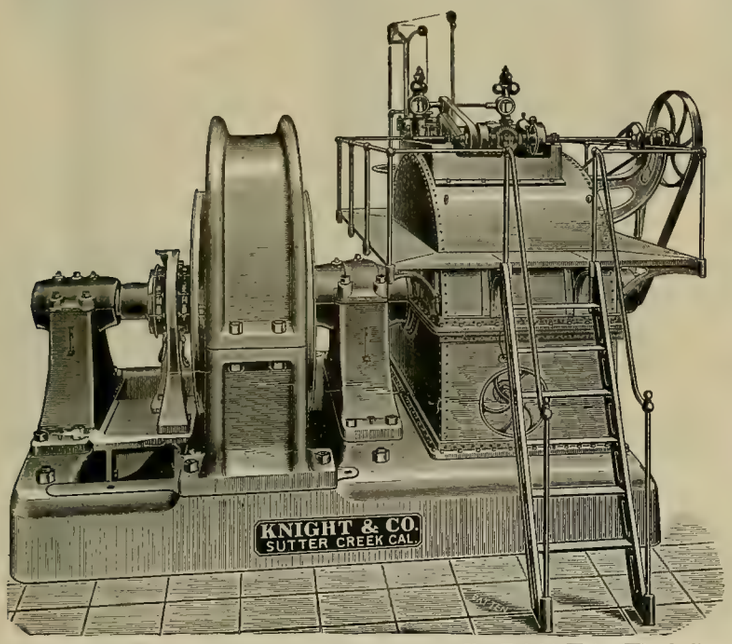
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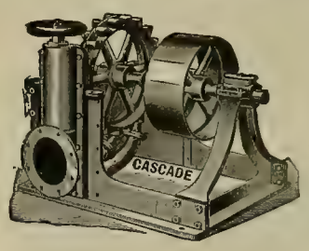
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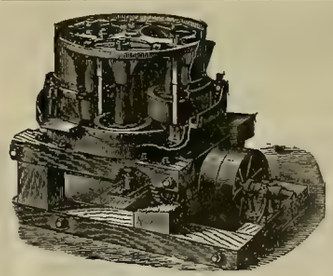


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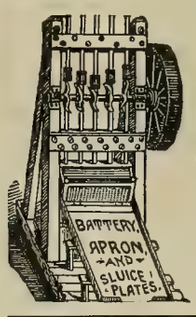
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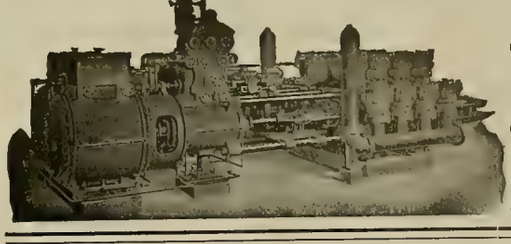
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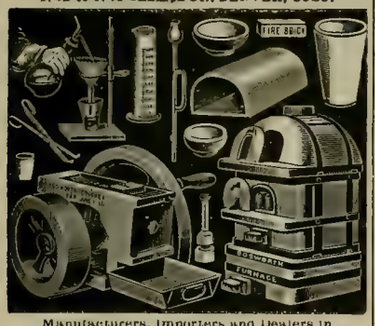


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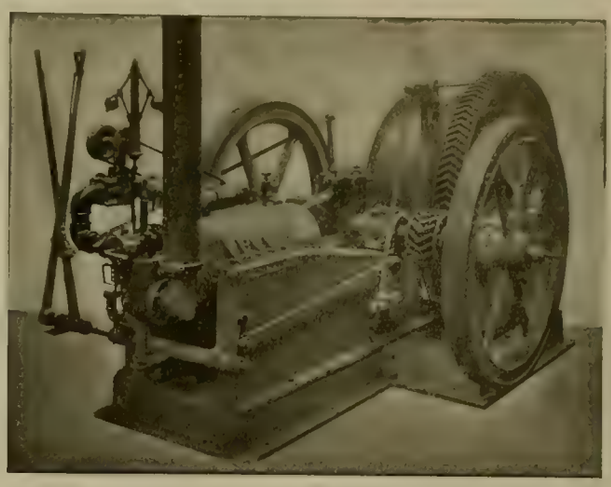
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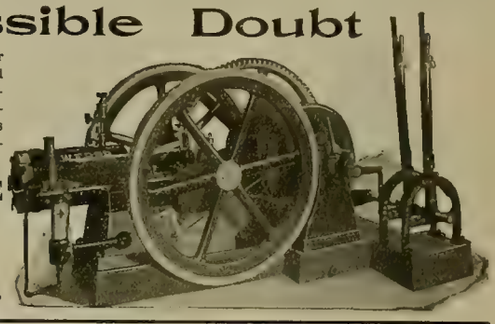


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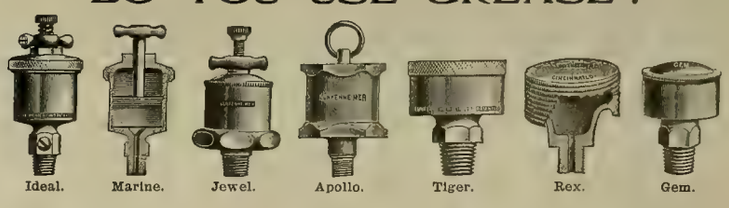
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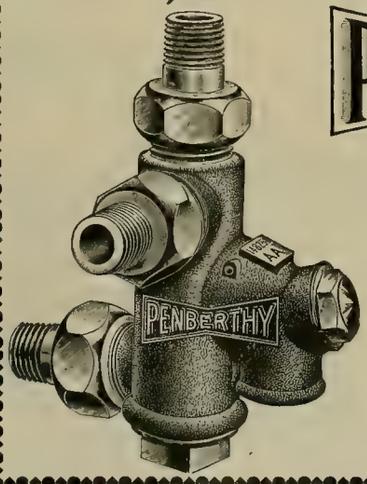
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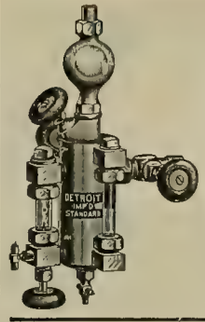
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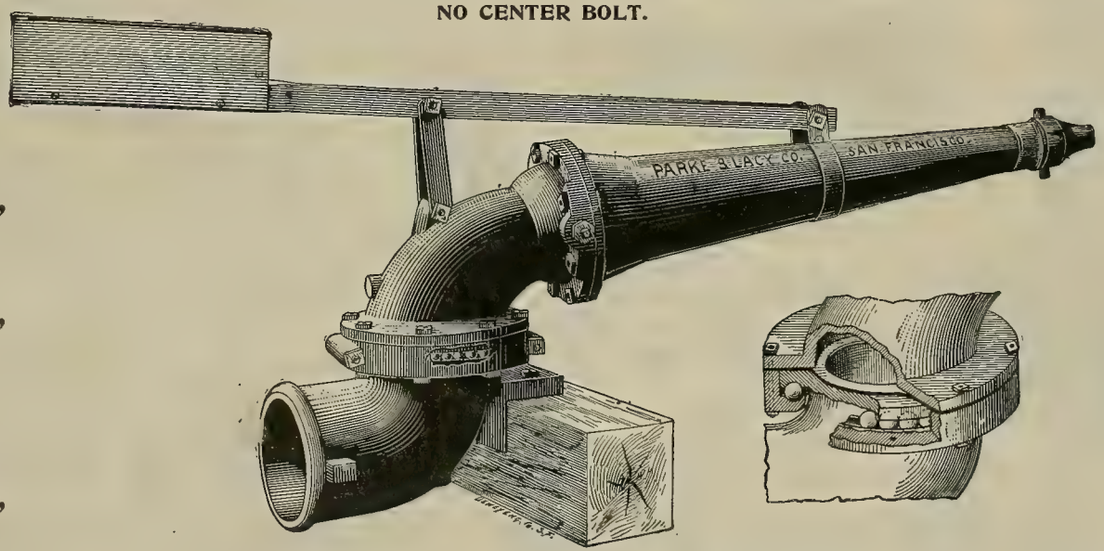
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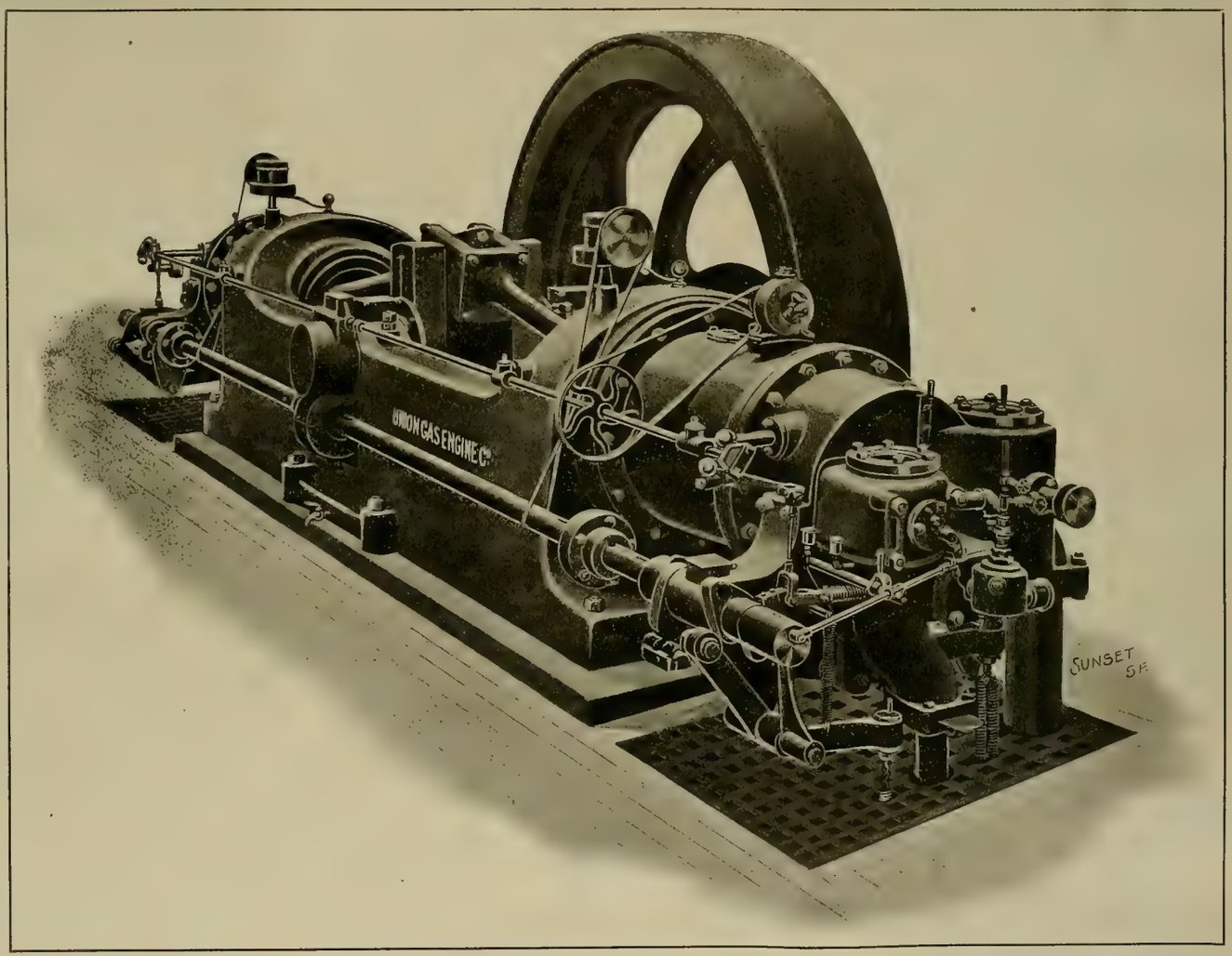
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AND PACIFIC ELECTRICAL REVIEW.

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A 150 H. P. Gasoline Engine.

This illustration shows the latest and largest type of gasoline and distillate engine produced by the Union Gas Engine Co. of San Francisco. This is a horizontal duplex engine of 150 H. P., with one flywheel and out-board bearing, self-starter and all the latest improvements of Union engines. Each cylinder is virtually a separate engine, as each has its own governor, gas generator and working parts, so that each can be worked separately. When running full there is an impulse, or working stroke, for each revolution, thus insuring steadiness and close regulation of speed. The engine is started with the Union self-starting device, which the manufacturers say makes it as easy to start as a steam engine. It is so constructed that all residue of burnt gases is removed from the cylinder before the next charge of gas and air is introduced. This is a new and valuable feature in the Union engines and adds to the economy of running. The Union Gas Engine Co. have moved to their new works, 244 First street, San Francisco, where they are building all sizes from 3 H. P. to 150 H. P., and are designing engines of 250 H. P. and 500 H. P.



150 H. P. Gasoline Engine.



Lucky Boy G. M. Co.'s Mill, Custer City, Idaho. (See page 495.)



Economic Extraction Co.'s Plant, Victor, Colorado. (See page 495.)

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THE dreadful explosion in the Scofield, Utah, coal mines, an account of which appears on page 496, is unparalleled in its deplorable fatality. It is thought that when the sad work of carrying out the dead is completed, it will be found that nearly 250 coal miners lost their lives. The cause of the disaster is unexplained. All colleries are subject to such explosions, even those in which care and constant effort contribute to keep comparatively safe. The best that can be done is to reduce the number of such disasters to a minimum. The Pleasant Valley colleries at Scofield, Utah, were generally reported to be free from fire damp; but, if it is true, as stated in the report, that mine No. 4 was used as a giant powder magazine, it will not be hard for the investigating committee to find out the cause of the accident, if "accident" it can be called, where the combination of carelessness, coal dust, gas and access to giant powder would form so formidable and certain a combination. This paper has repeatedly pointed out the criminal folly of underground storage of giant powder, and that such careless practice was allowed in this case seems almost impossible to believe.

IN the issue of the 14th ult. was noted the sale of the Stanley mine, Idaho Springs, Clear Creek Co., Colo., to Montreal residents. Much was locally published regarding the value of the property and the mutual advantage of the transfer. It now transpires that alleged sharp practice and duplicity interfere with the transfer. The facts, as locally set forth, are represented to be to the effect that C. A. Gehrmann of Idaho Springs owned one-quarter interest in the property and vigorously developed it for the company, making "a good mine" of it. He then succeeded in selling the property to three persons in a private deal, the buyers depositing $25,000, Gehrmann having the power of attorney to make the sale. The new owners then sold the mine to the Montreal people for $850,000, and 20% royalty on all ore subsequently extracted therefrom. The Montreal men paid $250,000. They claim they paid this money to Gehrmann and that he agreed to deliver the mine to them when the board of directors ratified the sale. At a meeting of the directors for that purpose Gehrmann offered them $375,000. The company directors refused to take less than $850,000 minus his commission of $100,000 for making the sale and his one-quarter interest. The Montreal people want to take the mine according to contract; the Colorado company, including Gehrmann, want to have them take it; Gehrmann is unable to deliver it but declines to proffer his company more than the $375,000, which they decline to accept, thus making a deadlock. As at present the Montreal men have parted with $250,000, without immediate prospect of possession of the mine for which they partly paid, and the Colorado parties seem to be getting ready for tedious litigation. These things always have a bad effect on mining sales, and in such effect the matter becomes a public concern instead of a private squabble over division of the proceeds.

Mineral Land Classification.

In Chaffee Co., Colorado, in Idaho, Montana, parts of California and the State of Washington has arisen this year renewal of conflict as to legality of claims of lands, "chiefly valuable for stone," as in distinction to other classification of lands. The last word has not yet been spoken thereon, but the most recent decision in the matter—that by Judge Hanford in the U. S. Circuit Court, Washington district—tends to clarify the question.

The case was The Northern Pacific Ry. Co. vs. J. A. Soderberg. When the suit began Soderberg was in possession of the land in dispute and was quarrying and selling granite therefrom. He claimed title and right to remove stone because of proceedings begun by him to acquire U. S. title for the land as a placer mining claim pursuant to the Act of Congress of date Aug. 4, 1892, entitled "An Act to authorize the entry of lands chiefly valuable for building stone under the placer mining laws."

There was no controversy between the Railway Co. and Soderberg as to the facts; the suit was solely to determine the question whether granite was "a mineral" within the definition of that word as it is used in the Act of Congress granting lands to the N. P. R. R. Soderberg had perfected his title to the land, and, after contest, the Land Department had issued a patent to him. In another case in which the same question was raised, the court referred to, at a term held in Spokane, decided the question the other way, in favor of the railroad, the court then believing that its decision was in harmony with the rule prevailing at that time in the Land Department.

In this last litigation—that in which Soderberg was defendant—the matter was considered a test case; counsel on both sides went into the question at great length, and the court gives a long opinion, deciding for defendant and against the Railway Co. The gist of Judge Hanford's opinion is that it is not to be understood that Congress, in the use of the word "mineral," intended it to have a limited definition and to include only metalliferous minerals. In its common and ordinary signification the word "mineral" is not a synonym for "metal," but is a comprehensive term, including every description of stone and rock deposits, whether containing metallic substances or entirely non-metallic. Congress having chosen a word of such broad significance to define the class of lands reserved from railway grants, the courts and the Land Department have no authority in construing the Act to give a narrow or limited definition to the word in order to enhance the value of the railway grant, and to thus diminish the rights of the public in the lands reserved. Thus, as the granting Act does not indicate an intention on the part of Congress to restrict the meaning of the word "mineral," and in subsequent statutes stone lands are classed as mineral lands, the court, therefore, decreed for defendant, Soderberg.

It is to be further noted that in the Idaho-Montana mineral land bill, and in the California mineral land bill now before Congress, but to be probably superseded by Commissioner Hermann's mistaken measure, the statute does not direct that only lands valuable for the metalliferous minerals therein should be classed as mineral lands, but gives the same meaning to the word "mineral" as that in the Act of Aug. 4, 1892, viz., all minerals, whether containing metal or not, except iron or coal.

In view of the magnitude of the interests involved, and its particular importance to Western miners, the decision, including the point upon which it is based, is worthy of editorial notice.

TO THOSE familiar with former Comstock milling methods more than ordinary interest attaches to the proposition that future treatment of high-grade Comstock ore shall be at the Selby Smelting & Lead Co.'s works near Vallejo, Cal., the purchase price to be based on the average railroad car sample assay value of the ore upon arrival at Vallejo, paying a minimum of $19 per ounce for the gold and 95% of the current New York price for the silver. A 300-ton lot is to be given a test from the Con. Cal. & Va. If mutually satisfactory, the idea is to send monthly about 500 tons ore averaging above $25 per ton, ore below that value to be worked at the Kinkead mill at Virginia City, Nev. Past and present conditions as to Comstock costs afford interesting comparison. In 1868 the cost of running 938 feet of tunnel on the 400 level of the Gould & Curry was $16.84 per foot, and of 1465 feet on the 200-foot level $16.08 per foot. In the same mine that year the average cost of extracting ore was $8.82 per ton; in the Hale & Norcross, $9.08. The cost of milling Gould & Curry ore that year was $13.30 per ton; of Savage ore, $14.04; of Hale & Norcross, $14.26. The cost of sinking 692½ feet of the Bonner shaft in the Gould & Curry was $75,738.40.

Taxing Unpatented Mining Claims.

A. S. Bosquit, as Tax Collector of El Dorado county, sold a mining claim, lot 45, section 34, township 13, last Saturday, property that had been sold to the State for delinquent taxes and never redeemed. This was the first sale of the kind in the county under the new law. P. B. Hogan was the purchaser, and the price paid was $265.—Mountain Democrat, Placerville, Cal., April 28.

The above-mentioned property was advertised in the Gazette previous to the sale. As the total amount for delinquent taxes, advertising notice of sale, etc., only amounted to $52.91, the State made $212.09 by the transaction.—Gazette, Georgetown, Cal., April 30.

But did it? Does "the State" "make" anything by such transaction? This whole matter of assessing unpatented mining claims, afterward "sold to the State for delinquent taxes," and subsequently bid in at public vendue is a farce. That it is "the law" makes no difference. It is a silly statute, and if ever seriously contested will be beaten.

The whole anomalous system is one more addition to the load carried by the miner, one more deterrent influence against investment. In years past the State was the purchaser at such delinquent tax sales and held the certificate, no buyer desiring such unsubstantial title. Since the passage of the new law such deed must be recorded, but can only serve as a continual cloud to title. There is no procedure provided for examination and cancellation of invalid certificates, and the statute asserts absolute title, and right of possession of unpatented lands, and makes the deed per se conclusive as to the regularity of all proceedings and sale. The vagueness of descriptions in these certificates at times creates additional confusion, making menace to titles to valuable property, in no way affected or connected with the delinquent property.

Some county tax collector could refuse to make the deeds to the State until mandamused by the court. A test case should be made. It is hard enough now to sell a mining property without adding uncertainty of title.

Apart from all this is, however, the plain proposition—the law in the case—that, until patented, the title rests in the general Government, and the State can not make good its claim, or hold the land as subject to taxation. Of course, may come the legal quibble that the State does not tax the claim itself, but only the locator's possessory right therein, and this possessory right thus defined is "real estate," but when the tax deed is made out, it is not the owner's possessory interest that is mentioned, but the claim itself. The State can not go to mining, and can only technically deprive the prospector of his claim, without gaining anything. It is inferred in one of the extracts above that "the State made $212.09 by the transaction." A fine business, indeed, for the commonwealth of California to be engaged in!

In assessing unpatented mining claims, the assessor simply copies from the county records a list of locations and arbitrarily values them; he never looks for them; probably couldn't find half of them if he did. The State can not do the assessment work needed to hold the claim that it tries to take away from the prospector, and usually its title is extinct long before it issues its deed. All the prospector can do is to take time for his ally, and when the ground is open to legal relocation, locate it again. Then the State can assess him again, and, when delinquent, can sell him out again, and so on—a good way how not to develop a country. If the State needs money, let it charge a license. The present plan does not rise to the dignity of meriting contempt. It is an anachronism, a mess of muddling methods, mulcting miners, and of injury to the State.

Concentrates.

A QUICKSILVER MINE with 1% ore is susceptible of very profitable operation.

THE U. S. Circuit Court of Appeals has recently decided that imported zinc dust does not have to pay duty.

AN arrastra can be made or bought. It is essentially a fine grinding machine, and ore exceeding ¼ inch should not be fed to it.

THE company specially mentioned by L. V. T., Leadville, Colo., seems to be organized on the pliant plan to "always sell out at the right time."

THE fact that the terms of a sale as made by an agent varied from the terms of his authority is immaterial, where the principal ratified the sale as made.

IT is only the individual share of a partner, after all the affairs of the firm have been fully settled, that can be taken and applied in the payment of his individual debt.

THE first number of the MINING AND SCIENTIFIC PRESS appeared May 24, 1860. The first number of the Engineering and Mining Journal, of New York City, March 31, 1866.

A CONGRESS OF MINING AND METALLURGY will be held in Paris from June 18th to 23rd. Particulars may be had from the secretary, Mons. Gruner, 55 rue de Chateaudon, Paris.

THE fact that the parties to an oral agreement expected that a written contract, embodying the same terms, would afterwards be signed, does not prevent the oral contract from taking effect.

CAST COPPER is as susceptible of high electric conductivity as any other, if oxide of copper be absent. If cast direct from the refinery furnace, with few cold sets, it should ordinarily give satisfaction.

A FLAT ROPE will last as long as a round rope for mine hoisting, the difference being in the cost of repairs, a flat rope having to be resewed about every six months, while a round rope often goes two years without any repairs.

MINING and electrical engineering offer profitable field for action to the trained technical worker, who, if he has the requisite knowledge, the ability to specialize, and the energy to use opportunity, should find fitting place at the front.

AT the equator a degree of longitude equals 69.16 miles; at 30° latitude a degree of longitude equals 59.94 miles; at 50° latitude a degree of longitude equals 44.54 miles; at 70° latitude a degree of longitude equals 23.72 miles.

WHERE a debtor tells a person in whose hands an account has been placed for collection, without objecting to the same, that he will pay it, it is a stating of account between the parties, and the amount bears interest from that date.

MASS means the quantity of matter in a body; energy, the amount of power stored in a body; velocity, the rate at which motion proceeds; kinetic force, the amount of force that a moving body can exert in overcoming a resistance.

SECRETARY OF THE INTERIOR BLISS has decided that the law to the effect that all mineral applications must be published in the paper nearest the claim means just what it says, and that any other publication of application for patent is not legal.

IN California, mining company directors can conduct the ordinary business of the company; but when it comes to selling, leasing, mortgaging or otherwise disposing of any part of the mining ground of the company, or obtaining, except by location, any additional mining ground, such acts are illegal unless ratified by a majority of the stockholders.

IN charging a storage battery one loses about 20% of the energy supplied to it; in operating a motor with this current there is lost 10% of what remains; in converting the mechanical energy of the motor into electricity for charging the battery again would be lost another 10% of the energy. In general, losses of electrical power may be assumed at 7% in the generators, 10% in the line and 7% in the motors.

A PLACER CLAIM cannot cross lode claims and exclude the conflicting areas, for it is only the surface ground which the claimant applies for; so, unless the placer claim covers disputed territory which the claimant does not intend to exclude, which territory had been surveyed for patent previous to the placer survey, there can be no conflict with other claims. In the case of placer surveys a descriptive report must be attached.

DIMENSIONS of a good assay furnace may be: firebox, 16 inches long by 14 inches wide; height of lower muffle above grate bars, 14 inches; width of firebox at bottom of the 9x15-inch muffle, 12 inches; width between muffles of furnace walls, 8 inches; upper muffle, 5½ inches above lower muffle; above upper muffle opening to chimney, 4x16 inches; one foot above muffle chimney, 9x9 inches; space between rear end of muffles and furnace walks, 2 inches.

FOR a copper test, saturate a bead of salt of phosphorus—microcosmic salt—to opalescence with magnesia. This bead when flamed will become white. The slightest trace of copper will show in the cold bead a rich rose-red coloring, if the bead is held in the fusing zone. The strongest possible blowpipe flame must be used. The bead in an oxidizing flame, or when hot, is colorless. Metallic copper or the most complex ore can be used. One two hundred and fifty thousandth of a grain of copper will make a showing.

THE survey of a millsite for patent and the notes thereof are similar to those of a lode claim. The ties are made from the various corners. From corner 1 to a corner of the public survey, and from the other corners, ties are made to adjacent claims if there are any. The description starts with corner 1 and continues around the boundary lines of the site. There can be no intersections with other claims, for the reason that a millsite can only be located upon what is considered to be non-mineral land.

WHAT is known as the "life" of a boiler generally depends upon the amount of corrosion to which it is subjected. With good feed water, which will neither corrode the metal nor cause the deposit of a dangerous scale, and with care to keep the outside surface perfectly dry, a life of forty years for a plain cylinder is not uncommon. With slow corrosion its life may be reduced to five years or less, with the additional inconvenience that the pressure of steam which may be safely carried is continually being reduced during its life.

ONE way of refining impure amalgam, which brings amalgam 400 and 600 fine up to 800, is by passing a strong blast of air through the impure amalgam, the scum of oxydized copper and iron which gradually forms on the surface being taken up by a weak solution of sulphuric acid to which common salt is added from time to time. The process is quickened if a weak electric current, enough to overcome the resistance of the liquid on the mercury, is used. The impurities in the amalgam immediately gather around the anodes, and gradually pass into solution. If the current and acid solutions used are very weak, there is no danger of attacking the mercury, and the refining is very quick.

A FLEXIBLE METAL hose is made at Pforzheim, Germany, by rolling up a metal band like a screw thread, the specially profiled edges engaging in one another so as to form a continuous joint, which is made tight by a cord of rubber or asbestos. The metals chiefly used are galvanized steel and phosphor-bronze. The pipe is remarkably flexible, and its one disadvantage of tending to untwist through rough usage is overcome by making it double, with opposite windings. It is intended for mining purposes instead of rubber hose. It is made up to 8 inches in diameter, and to withstand pressure up to 200 atmospheres. A flexible metallic tubing of value for mining and mechanical purposes was described and illustrated in the issue of Feb. 3, 1900.

THE induction coil which usually accompanies medical batteries is made by winding on a bundle of iron wires a comparatively short length of heavy wire, which is called the primary coil, and over this a coil of many turns of fine wire called the secondary coil. Before putting the wire on, the iron core must be very carefully insulated with paper dipped in paraffine or shellac. When this is dry or hard, wind one or two layers of, say; No. 16 cotton insulated wire. Insulate this carefully as before and then wind over it four or five or more layers of No. 30 to 32 insulated wire, carefully insulating each layer from its neighbor. The value of the coil will depend very largely upon one's skill in winding and the care with which the insulation is effected.

DURING the period of sixty days of advertising the application for patent which follows the approval of the survey of a mining claim, any one believing that he has a better title to the ground than the applicant may bring an adverse suit against the claimant by filing adverse papers in the U. S. Land Office for the district in which the survey is located. One of the essential things in such a suit is an adverse plat, which must be made by a U. S. deputy mineral surveyor. It must be made from an actual survey on the ground, and so certified to by him. The survey must describe the conflict said to exist, and must be a description by metes and bounds, and the area of the conflict must be stated. The calculations are made in exactly the same way as if for patent.

A SPECIMEN ASSAY is made to determine whether a piece of rock, mineral, or other material contains gold, silver, etc. No sale of ore is made on the assay, and it is therefore unnecessary to make a number of check assays. Control assays are made on samples prepared from and representing a lot of ore which is for sale, and are usually either checks on the assay made by the assayers of sampling works, smelters or mills. Four checks are always run, and if the sample is not perfectly homogeneous, often many more; also, as not infrequently happens, if a repeat is required, because assays do not agree, no extra charge is made. Umpires are assays made to settle differences between other assayers. These call for all the skill and ability of an assayer, as often thousands of dollars depend on the result. Often eight to ten checks must be made, as the trouble is frequently due to coarse gold or non-homogeneity of samples.

TROUBLES common to steam boilers are: 1. Tendency to accumulation of scale or mud on the plates over or near to the fire, causing "bagging" of plates, leakage of seams, and sometimes explosions. 2. Overheating of seams where they overlap, the metal at these points being of double thickness, especially when the seams are covered with scale. 3. External corrosion, commonly caused by dampness or rain water percolating through a deposit of dust and soot, which is apt to contain sulphur combinations formed from the gases of burning coal. Such corrosion is especially apt to take place when the boiler is cold. 4. Internal corrosion, generally due to feed water containing acid; but sometimes corrosion seems to be caused by very pure water containing dissolved oxygen, such as rain water. In mining regions corrosion is probably the greatest danger to which boilers are exposed, next to negligence of attendants, and great care should always be exercised in frequent inspections, to learn whether or not corrosion is taking place. Whenever it is found, steps should be at once taken, by treatment of the feed water or otherwise, to remove its cause.

TO OBTAIN a commission of U. S. deputy mineral surveyor, the applicant is required to pass an examination before the surveyor general's office. This consists of the figuring out of intersections between conflicting claims, the ties and boundary lines of the claims being given by courses and distances, the calculation of the areas in conflict, and the solving of various trigonometrical problems. The applicant is also examined at considerable length on the rules to deputies, and is required to write out a set of notes from data furnished him. If he passes this office examination satisfactorily he is examined in the field on deflecting lines from the true north and south meridian. These lines he runs with his own transit. This ends his examination. He must also show that he has been in some surveyor's office for six months prior to his examination and must file bonds for $10,000. If everything has been satisfactory his commission issues.

TO DETERMINE the amount of lead in lead ore, one way is to weigh one gram of the ore if rich, more if poor, into a platinum dish, cover with a watch glass and add 40 to 50 c.c. of a mixture of one part sulphuric acid (1.84 sp. gr.) and three parts nitric acid (1.42 sp. gr.) Heat the covered dish on a hot plate, water bath or sand bath until the action of the acids on the ore has apparently ceased. Then remove the watch glass and rinse into the dish. Add 10 to 15 c.c. hydrofluoric acid to the solution and evaporate until dense white fumes of sulphuric acid begin to come off. It is better to conduct the evaporation under a hood for various reasons. Remove the dish from the source of heat and cool. Dilute to about 100 c. c. with water, digest till all soluble salts are in solution and filter, washing first with a 2% solution of sulphuric acid and then with alcohol. Dry, burn filter paper, and ignite precipitate separately. Weigh as lead sulphate and calculate per cent of lead present in the ore.

THE alleged existence of gold in old mining timbers has been investigated in California and Colorado with negative results. According to O'Driscoll in his "Notes on the Treatment of Gold Ore," he says that in experiments by J. C. Newbery, Chief of the Technological Museum, Melbourne, Australia, he examined mine timbers which had long been saturated by mine waters, expecting to find in the fibers of the timber gold which had been precipitated from solutions. "Some large logs of undressed close-grained eucalyptus timber, which had been in mine waters between twelve and fourteen years, were experimented upon; the outsides of these were cut away and perfectly sound pieces were obtained. These were dressed quite smooth, and to all appearances were as ordinary pieces of planed timber. They were then carefully calcined and the ash examined, a considerable quantity of highly minute gold and silica being found. Microscopical examination of these showed that both gold and silica were in irregular particles, quite unlike the forms they would have assumed had they been there precipitated from solutions; the capillary attraction of the wood had drawn them amongst the fibers together with the water." This whole matter was given scientific analytical discussion in the issue of Dec. 11, '97.

RETORTING AMALGAM depends upon the fact that, if amalgam is heated slightly above the temperature at which mercury boils, the mercury will be volatilized and distill over, leaving the spongy gold behind. A retort usually used in small mills is of cast iron, the cover and retort turned and ground to fit each other perfectly. The bale is of wrought iron, and takes hold under the flange on the retort, then the wedge is driven in between the cover and bale, making a secure joint. The pipe condenser is placed so that its lower end is immersed in water while the retort rests in the fire. It is made in various sizes—from 3⅞ inches inside diameter at the top by 3¼ inches inside diameter at the bottom and 4½ inches depth to 12 by 10 by 17½ inches. This size retort requires no special setting, but may be heated in the blacksmith's forge or in a crucible assay furnace. The inside of the retort is covered with chalk or paper to prevent the bullion adhering to the iron. The balls of amalgam are placed in the retort and packed down with a bolt head. The retort should not be filled more than two-thirds. The cover is clamped on and the retort is heated gradually at first. Shortly after it has attained the temperature at which mercury boils, the mercury commences to distill over and is condensed, falling into the water. The heat is kept stationary until nearly all the mercury has distilled off, when it is gradually raised to bright redness to expel the remainder of the mercury. After cooling, it is opened and the retorted bullion is removed. If the retorting has been properly conducted, the bullion should not contain over one part of mercury in 1000, while if heated to too high a temperature at the commencement, or not sufficiently high at the end of the operation, it may retain a considerable amount. The retorted bullion should be remelted and cast into an ingot before it is sold. This is not universally done, but is the best practice, as it is impossible to obtain a true average sample from a retort.

Small Mine Concentration.

Written for the MINING AND SCIENTIFIC PRESS by S. I. HALLETT, Aspen, Colo.

It is very easy for a company having a large mine to get plans for a 100-ton or a 500-ton concentrator at a minute's notice from our manufacturers of mining machinery; but for the man who has a small mine, capable of producing from ten to forty tons per twenty-four hours, it is sometimes not so easy to get plans for a mill suitable for this tonnage that will be low in initial cost and at the same time make a good saving.

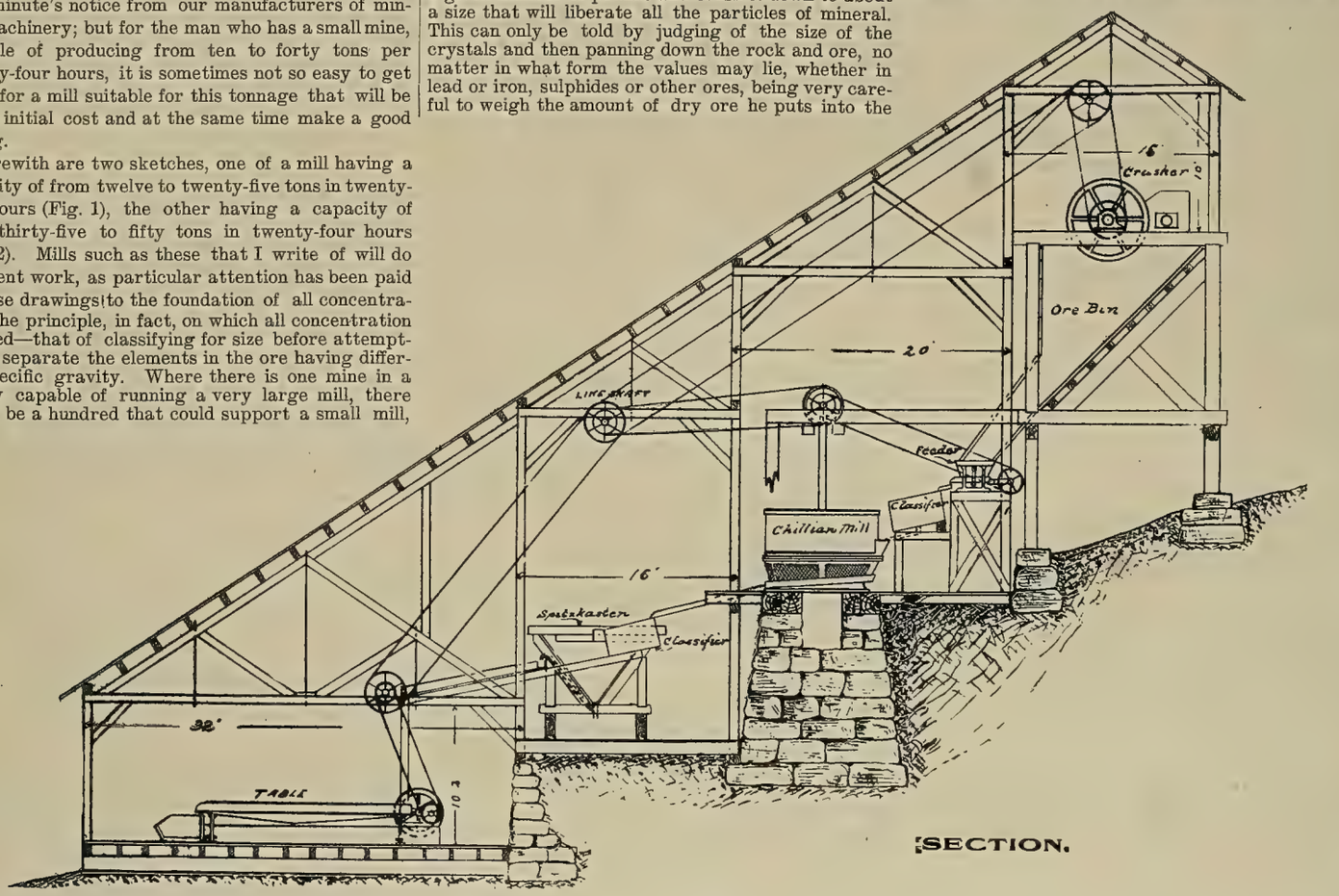
Herewith are two sketches, one of a mill having a capacity of from twelve to twenty-five tons in twenty-four hours (Fig. 1), the other having a capacity of from thirty-five to fifty tons in twenty-four hours (Fig. 2). Mills such as these that I write of will do excellent work, as particular attention has been paid in these drawings to the foundation of all concentration, the principle, in fact, on which all concentration is based—that of classifying for size before attempting to separate the elements in the ore having different specific gravity. Where there is one mine in a county capable of running a very large mill, there should be a hundred that could support a small mill, keep the mill going and make the owners money. When a man finds a lead in the mountains that looks as though it might carry a considerable amount of ore and of a paying value, he should first thoroughly satisfy himself as to how his values lie; whether the values are generally disseminated throughout the vein, or whether they lie in a pay streak; and do development work enough to get an idea of what his daily output can be, and still keep up development work. He will have assays made and, naturally, if his ore is of a high enough grade, will ship it to market without attempting to treat it on the ground. He will then almost daily pan his rock, if it carries gold values, to see whether the ore is free milling or not; but, even if free milling, he will undoubtedly have to catch the sulphides behind the plates.

In order to test for concentration, he should take a given number of pounds and crush it down to about a size that will liberate all the particles of mineral. This can only be told by judging of the size of the crystals and then panning down the rock and ore, no matter in what form the values may lie, whether in lead or iron, sulphides or other ores, being very careful to weigh the amount of dry ore he puts into the gold pan, and also in catching the dirty slimes that he pans off, drying them down by evaporation and assaying them; then taking his coarse tailings separately, drying, assaying and weighing them, and, finally, taking the more valuable heavy material left as concentrates in the gold pan and weighing these and assaying them as well. This will give him a very good idea as to whether his ore will concentrate or not.

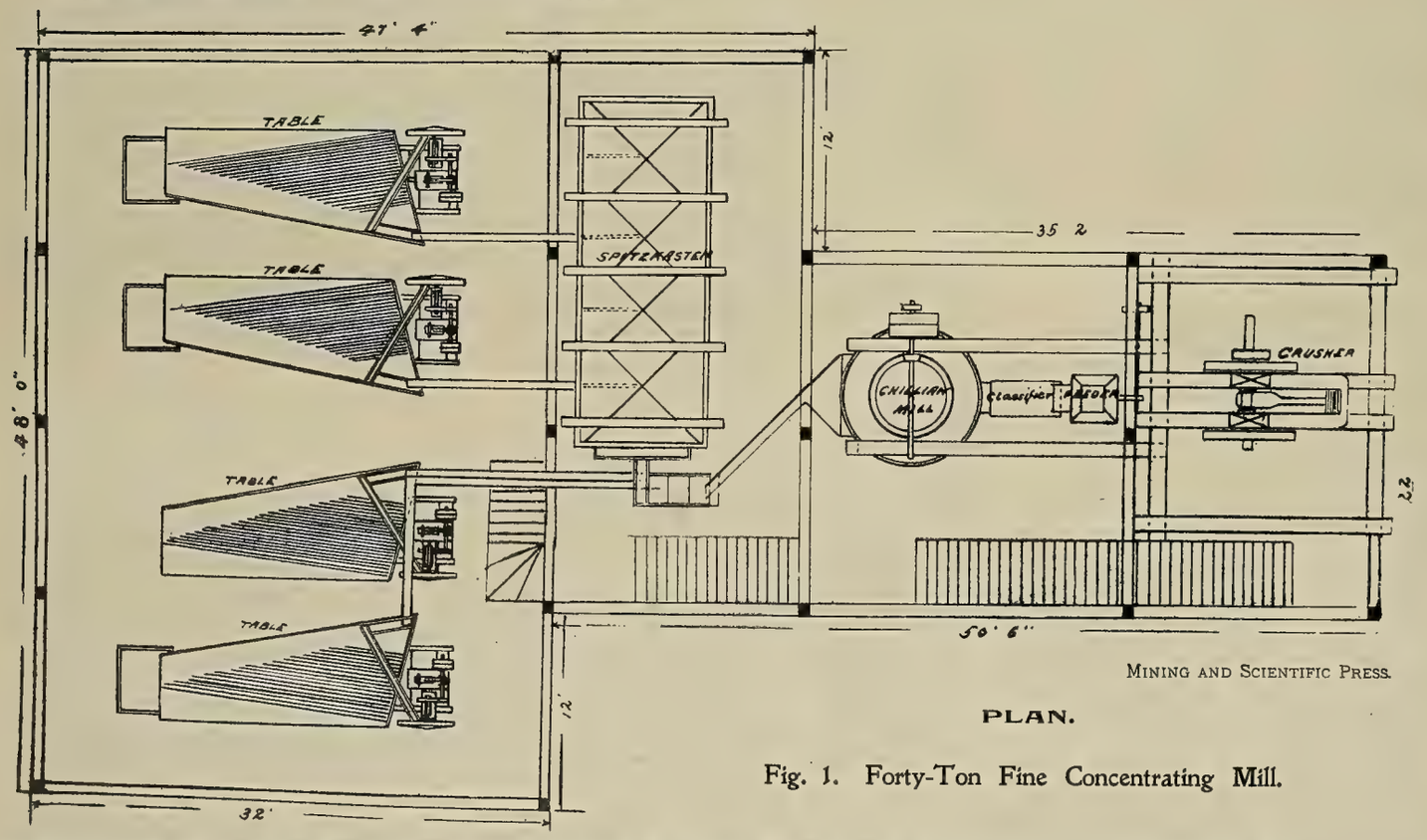
For the very first step in concentration it is necessary that he should have a concentrating ore, one in which the values lie with the heavier lesser portion of the ore. Having determined to his satisfaction that the ore will concentrate and that it is advisable to concentrate it, his next question is the size of a mill. Many men can afford to put up a small mill, or, failing in that and having a good small property, can get others to put up the mill for an interest.

There is no necessity for a man to be scared at the idea of building a concentrator. It does not require a fortune, and a small mine that can be worked at a profit with a small mill would usually be a failure with a large mill, because, in endeavoring to get the heavier tonnage, he would mine stuff that would not pay, whereas with the smaller mill he would only take that material that would return him a profit.

In making up these plans I have endeavored to sacrifice everything to initial cost, getting only those



SECTION.



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PLAN.

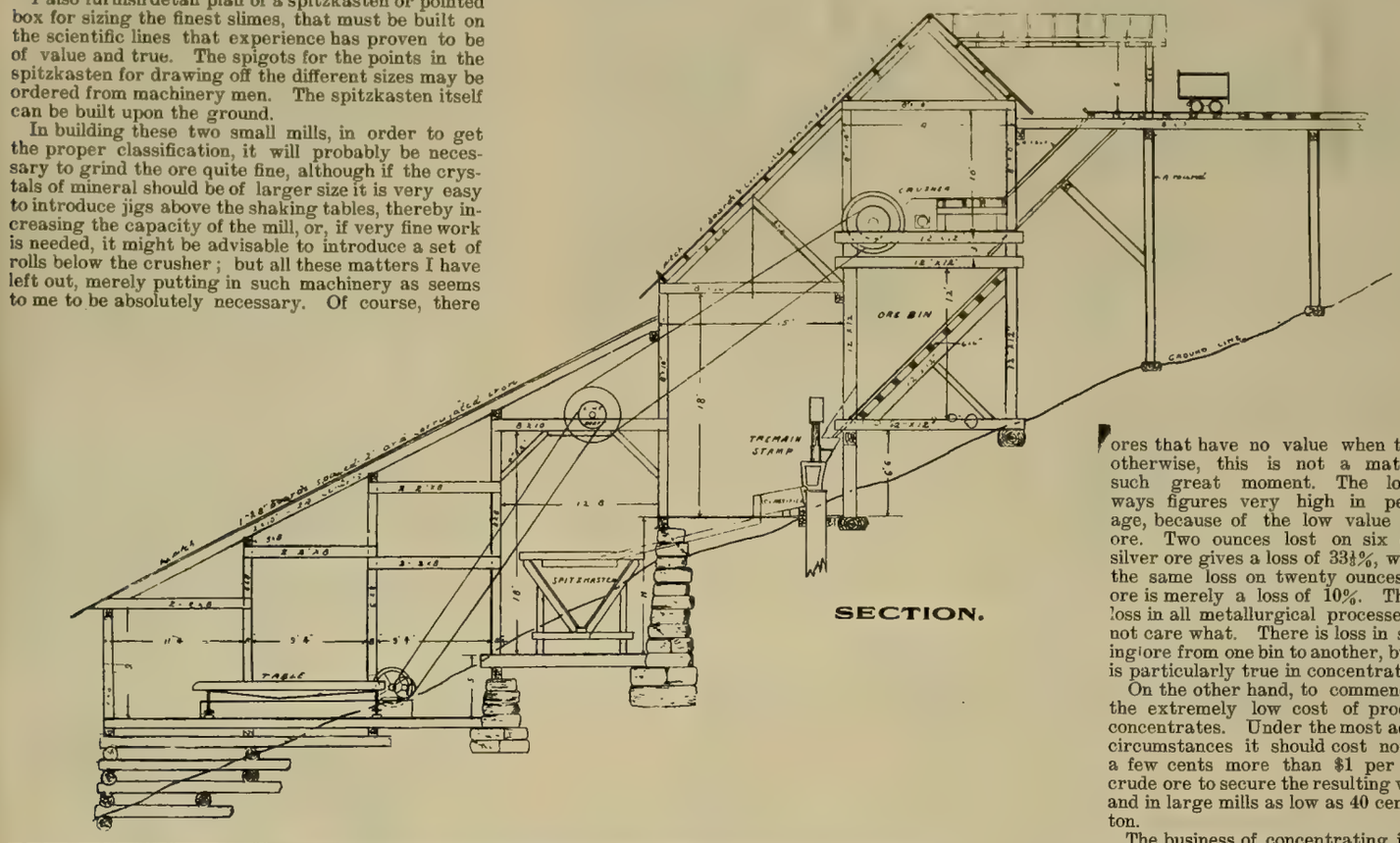
Fig. 1. Forty-Ton Fine Concentrating Mill.

pieces of machinery that are necessary to crush the ore and separate it, and with just as little concentrating machinery as will do the work. It is very easy to build an elaborate machine, but very hard to build a simple one.

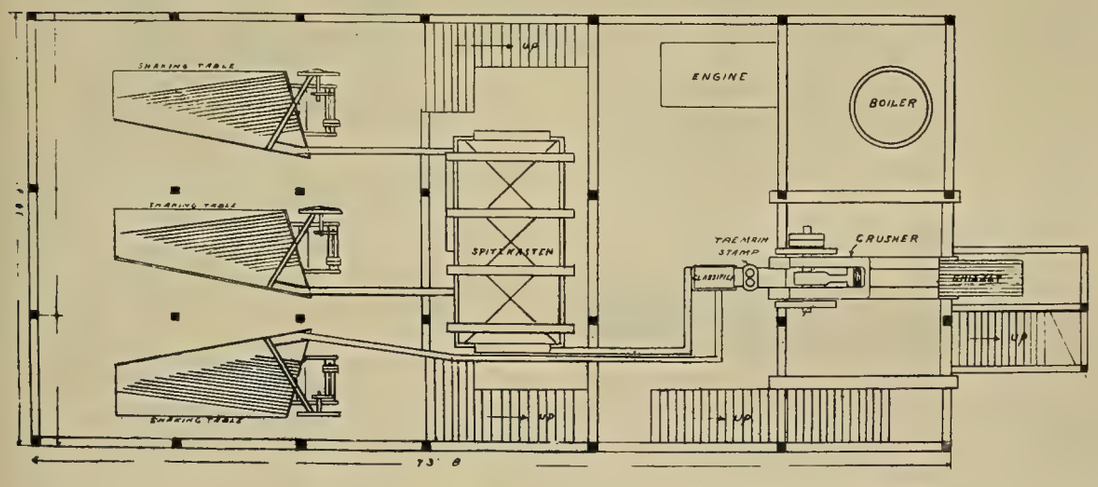
I am indebted to Herbert A. Wilcox, who has done the designing of the above Figs. 1 and 2, and to David Cole, both of Aspen, Colo., who has given me the design of a classifier to be used that is an adaptation of classifiers used elsewhere. This sketch of a classifier, that can be made by any carpenter, was sketched by Mr. Cole. It is suitable for a small amount of feed and does very excellent work when the tonnage is not too heavy. As it is very simple and can be made on the ground, I thought it might be of value.

I also furnish detail plan of a spitzkasten or pointed box for sizing the finest slimes, that must be built on the scientific lines that experience has proven to be of value and true. The spigots for the points in the spitzkasten for drawing off the different sizes may be ordered from machinery men. The spitzkasten itself can be built upon the ground.

In building these two small mills, in order to get the proper classification, it will probably be necessary to grind the ore quite fine, although if the crystals of mineral should be of larger size it is very easy to introduce jigs above the shaking tables, thereby increasing the capacity of the mill, or, if very fine work is needed, it might be advisable to introduce a set of rolls below the crusher; but all these matters I have left out, merely putting in such machinery as seems to me to be absolutely necessary. Of course, there



SECTION.



PLAN.

MINING AND SCIENTIFIC PRESS.

Fig. 2. Twenty-Ton Fine Concentrating Mill.

will be local changes, according to the ore, that must be figured on.

Very often it adds to the capacity of one of these mills to put a two-compartment jig before the final finishing grinder or stamps, using it merely for the purpose of discharging waste, and not attempting to make a clean concentrate with the jig, but feeding the final crushing machinery by means of spouts on the jigs, as all of the tailings that are discharged by these jigs, if there are any, do not have to be crushed fine.

The plans given above are rough mills, perhaps not suitable to all kinds of ore, but certainly give a foundation upon which to work. The crusher should be a fine-grinding one, grinding down from the original ore to certainly not more than half an inch in size. Such crushers can be found. For a hard ore, not having much clay, I would suggest the Gates crusher. For an ore having a soft material that is liable to pack, I would suggest one of the rotary jaw-crushers, the main idea being to crush from mine size down to the finest possible point with the one machine.

For a finishing machine in Fig. 1, I have put in a Tremain stamp mill, though any other form of steam stamps would undoubtedly do. I have endeavored to use all machinery that is self-contained and requires but very little foundation or buildings and that can easily be moved and transported.

The tables are of the shaking variety and are readily handled by any one of common judgment.

In Fig. 2, I have adopted the same style of crusher for these plans, but have placed a Chilian mill as a finishing machine, they having a larger capacity and also having this advantage: that it is possible to run all the machinery in this mill with a turbine or Pelton wheel where water power may be secured, whereas with Fig. 1 steam is absolutely necessary, as it is the direct motive power of the stamps. These Chilian mills are very heavy, but require few repairs, take up but little room and do not require an excessive foundation, as they are practically self-contained.

As the question of freight enters so largely into the cost of mining machinery, I will not attempt to give any prices for which these mills could be erected, but from the figures given any man manufacturing mining machinery could give a very close answer to any questions.

In traveling through the country in the mining regions one is surprised at the number of claims that have enough ore to run a small mill, either through the twenty-four hours or that could be run during the day shift, that would pay all the expenses of developing the property and still leave a profit, and as years go by such mines will be developed and worked far more than they have ever been in the past. Concentration really is coming to be part of a mining man's education, and, although it has made great strides in the past few years, like all other arts, it is still in its infancy. It has many qualities to commend it and many others to condemn. It is a wasteful process when done at its best, of necessity losing large amounts of the value of the ore in the endeavor to concentrate it; but as it is almost invariably used upon ores that have no value when treated otherwise, this is not a matter of such great moment. The loss always figures very high in percentage, because of the low value of the ore. Two ounces lost on six ounces silver ore gives a loss of 33⅓%, whereas the same loss on twenty ounces silver ore is merely a loss of 10%. There is loss in all metallurgical processes, I do not care what. There is loss in shoveling ore from one bin to another, but this is particularly true in concentration.

On the other hand, to commend it, is the extremely low cost of producing concentrates. Under the most adverse circumstances it should cost not over a few cents more than $1 per ton of crude ore to secure the resulting values, and in large mills as low as 40 cents per ton.

The business of concentrating is very fascinating, particularly as it does not require a technical education, being dependent more for success upon common sense than upon any other quality. It is all done so that the eye may follow it, and is not like chemical or smelting reduction, governed entirely by the assaying furnace and retort. Concentration is purely a question of detail. By saving a per cent or two here and there one man will save 90% of the values, while a more careless man, on the same ore and with the same machinery, will not save over 70%. It is a business in which the personal equation enters perhaps more largely than in any other branch of ore reduction. In this, as in other lines of business, the observing, careful man is the man of success.

THE TWENTY-TON MILL.

The ore is trammed directly from the mine to the mill and dumped over a grizzly. The fine stuff which passes through the grizzly slides down to the reserve ore bin under the crusher. The coarse stuff which would not pass the grizzly is shoveled into a crusher, passing through which it joins the fine stuff in the reserve bin below.

From the bin it is fed by automatic feeder attached to stamp into the mortar of a Tremain stamp where it is crushed, and, on leaving mortar, goes into a Cole classifier, having one discharge and one overflow. The first product is carried by launder to No. 1 table. The overflow goes to a three-compartment spitzkasten. The product of the first compartment is fed to No. 2 table. The second and third discharge is fed upon the third table. The overflow goes to waste. The concentrates are caught in the settling boxes at the foot of the tables, as in the forty-ton mills, and handled in the same manner.

THE FORTY-TON MILL.

The ore, having been delivered at the crusher floor of mill, is fed into crusher by hand shoveling. Passing through the crusher, it falls into the reserve ore

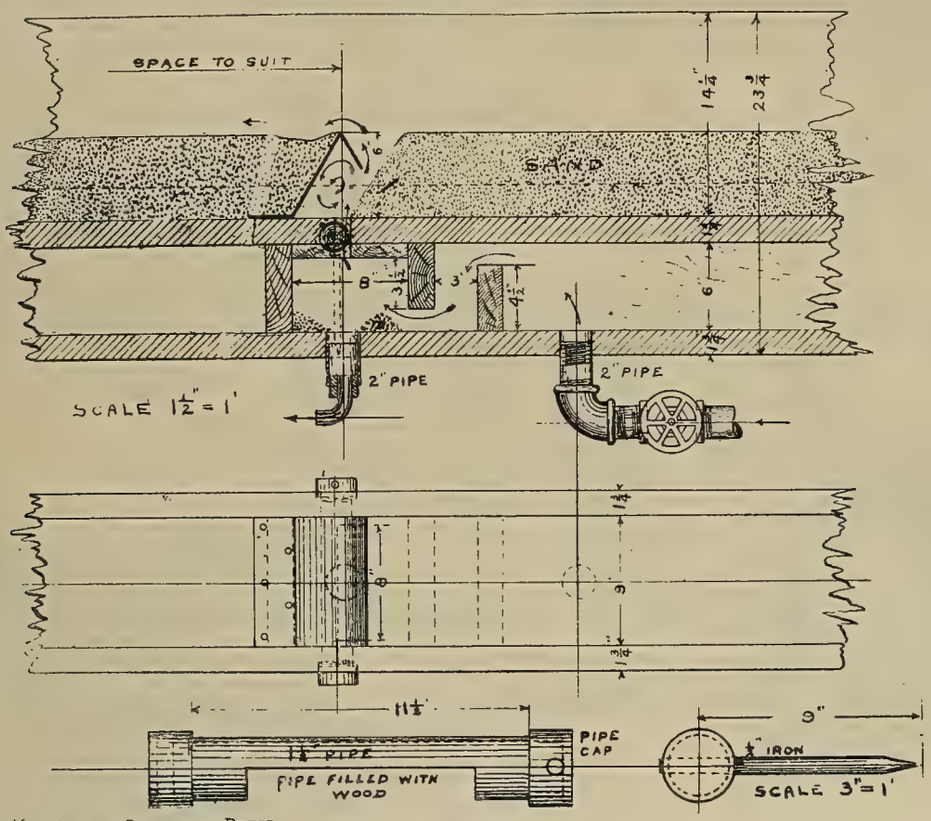
bin, located under the crusher. From this bin it is drawn off at will by means of a chute and automatic feeder, which delivers it into a Cole classifier. This classifier makes two products: The coarser material taken out by the classifier runs into a 5-foot Chilian mill, while the overflow is carried by a launder, not shown in drawing, directly to the spitzkasten. In the Chilian mill the material is further ground to pass a screen, when it passes on to the second classifier. This classifier is similar to the first in construction, but makes two products besides the overflow. No. 1 discharge is fed to No. 1 table, No. 2 discharge to No. 2 table and the overflow goes to the spitzkasten.

The spitzkasten has four draw-off pipes. The greater part of the material will settle in the first compartment and should be fed by itself to the third table. The product of the next three compartments may be fed together upon the fourth table. The overflow of the spitzkasten goes out the waste flume.

The concentrates made on the tables are caught in settling boxes at the lower ends of the tables, from which they may be shoveled out as often as necessary. Should a dryer be required, the same can be conveniently located in a shed, which could be readily added to the lower end of the mill without any alteration of this plan.

This mill would ordinarily require 25 H. P. to run it, depending upon character of ore and fineness of crushing, but it would be better to provide power considerably in excess of this. If steam power is used, put in a 40 H. P. engine and a 75 H. P. boiler, or larger, if steam is to be used for heating and drying purposes. Power plant may be located in a separate building or in a wing of the mill, the position of which would be governed by local conditions, but should be as completely shut off from the crushing department as possible, to avoid the deleterious effects of the dust.

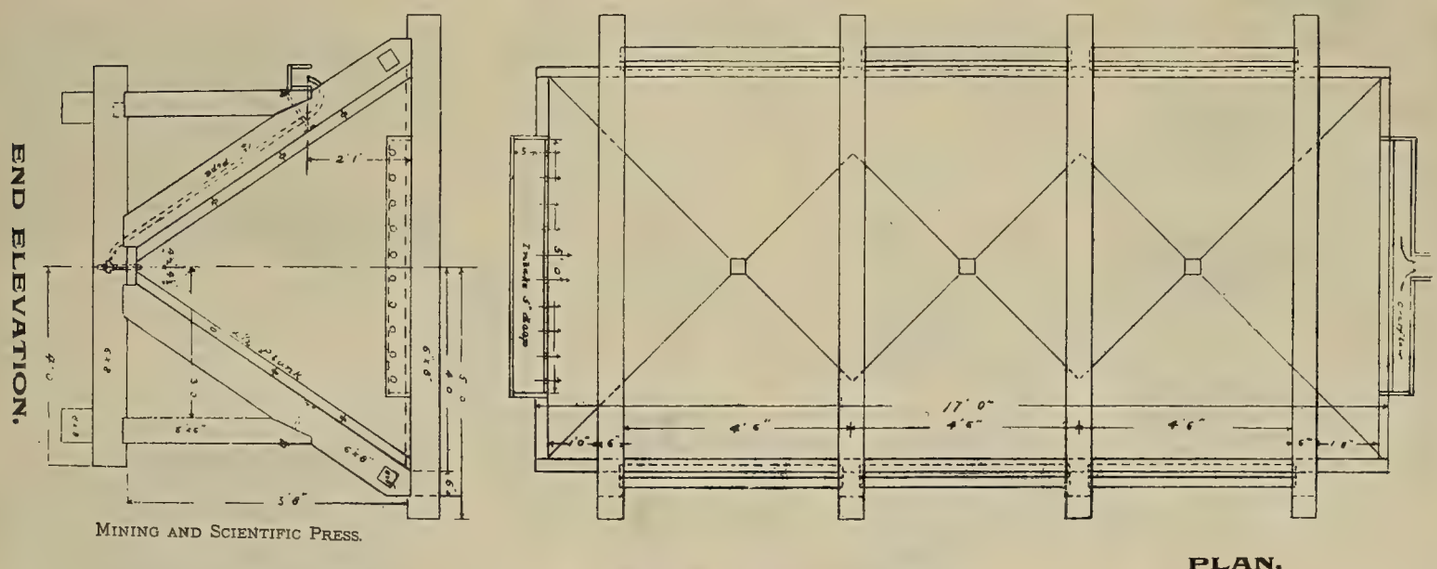
Detail of Hydraulic Classifier.



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Detail of Valve.

FIG. 3.



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Fig. 4. Three-Compartment Spitzkasten.

Don't Block the Way.

Mining is a legitimate industry, whose advance may not be for long kept in abeyance. But it frequently happens, and especially in the older camps, that a serious blocking comes in, and by the very men it most damages. Because a man has grown up with the camp is no reason for him to demand a "rake-off" from every sale or bond. Numerous sales have been stopped because of this, with the result that good prospects stand a good chance to remain prospects for years to come, whereas had a proper spirit been displayed they would now be well on the way to mines. The camp, having a host of idle and but few working mines, gets a black eye. Investors know something is wrong, and naturally fight shy. It may be changed before a new generation gets control, but not unless some of the old-timers let alone things in which they have no possible interest. If a buyer happens along, let him and the owner alone—you will get a good "slice" from the activity that will result from a sale to people able to make mines.—Idaho Mining Journal.

Making Lead Pipe.

Lead pipe is made by means of powerful presses, whose method of operation is extremely simple. Briefly stated, a piston working in a cylinder which has been previously filled with molten lead forces the lead through an opening, in the center of which a core is held. The core is to form the interior surface of the lead pipe, and the space between the surface of the core and the interior of the die determines the thickness of the walls of the pipe.

Adjacent to the press is a lead furnace. When the press is ready and the die and core are in place the cylinder is filled with molten lead, run from the furnace. The hydraulic machinery is set in operation, and the table bearing the lead cylinder is lifted, slowly, with tremendous power. With the cylinder, of course, rise the two bars that run up through the frame of the machine, and are joined above by the crosshead, and the crosshead carries with it the core holder; in fact, these are all immovable parts of one whole, so that, though the cylinder is in motion, the core, carried by the core holder, is always in the same position relative to the die. The cylinder is raised until the plunger or lead ram enters it and is brought into contact with the lead at some pressure. The press is then stopped a minute or two. The lead works better for the very slight cooling, and the pressure makes the mass more uniform. Then the press is set in operation again. The cooling pressure had been of about 200 tons; the working pressure in making pipe is up to 400, possibly up to 500 tons. The pressure is tremendous and continuous; if there is an opening in the cylinder anywhere the lead must go under that pressure. It cannot escape at the top, for the upper end of the lead cylinder is occupied entirely by the lead ram; but there is an opening at the bottom of the cylinder, the annular space between the core and the die, and the lead is forced out through that. It becomes perfectly fixed in shape the moment it leaves the mass of melted metal and the die. Forced through the annular opening steadily and continuously, it issues forth in the form of pipe.

When first seen coming out at the top of the press the lead pipe seems almost to shoot up, it rises so rapidly. One man operates the press; two more men handle the pipe. One of the men bends the rising pipe over so that it lies in the groove of a wooden wheel set upright over the press; after it is well started its own weight is sufficient to keep it on the wheel, and it is led thence to drums. The men who handle the hot pipe carry thick felt pads which serve as gloves, and are active while the press is in operation, for the pipes keep coming steadily.

A Senatorial Definition of Shoal Water.

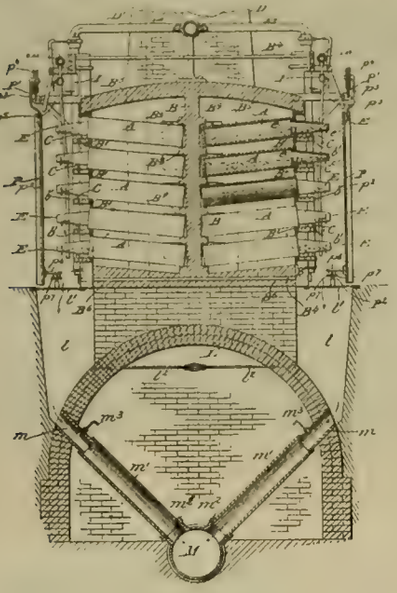
In a recent Senate debate, Senator Pettus impressively asked Senator Carter to explain what was meant by "shoal water," in the mining regulations of the Alaskan code. Senator Carter stated that shoal water was the water between the blue line of the sea and the shore. "It may extend 10 or 15 miles from shore, but if you can get gold 10 or 15 miles from shore so much the better for us," he added.

Mining and Metallurgical Patents.

Patents Issued April 24, 1900.

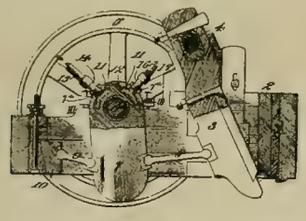
Specially Reported for the MINING AND SCIENTIFIC PRESS.

METALLURGICAL FURNACE.—No. 647,663; W. & J. Lanyon, Pittsburg, Kan.



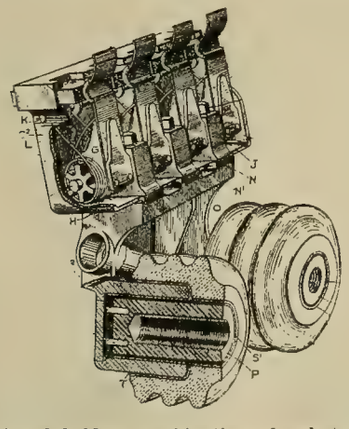
The combination, with block of furnaces, and cellar arranged longitudinally beneath and wider than block of furnaces, cellar having an arched roof onto which furnace may discharge, of plurality of branch conduits extending through and opening outside the hips of arched roof, branch cut-off being provided with removable portions, a main conduit in communication with branch conduit, screening device, and fan arranged to move material through conduits and discharge it onto the screening device.

VIBRATING PITMAN FOR CRUSHERS.—No. 648,015; G. W. Wright, Webb City, Mo.



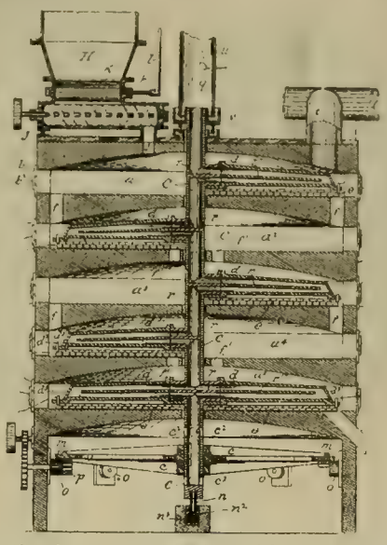
A vibrating pitman for reciprocating the active jaw of a crusher, comprising an opening in upper end of pitman, adapted to receive the eccentric part of an eccentric shaft, semicircular water chamber, located within the upper end of pitman, extending from side to side of pitman and straddling opening and separated therefrom, inlet and outlet radial pipe sockets located at top of pitman and on opposite sides of water chamber, radial pillars extending longitudinally of crown of chamber, and inlet and outlet pipes connected with respective pipe sockets; the inlet pipe directing flow of water from above downwardly onto inner wall of chamber from whence it is spread, divided up by radial pillars and distributed over inner wall toward outlet side of chamber and passes upwardly out through outlet pipe.

BRUSH HOLDER.—No. 648,052; E. D. Priest, Schenectady, N. Y; assignor to the General Electric Company, of New York.



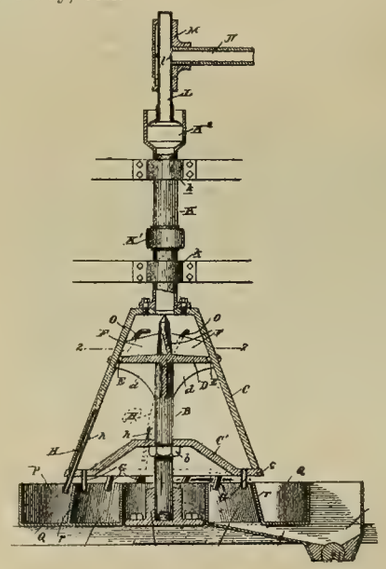
In a brush holder, combination of socket screw-threaded plug mounted therein and surrounded by sleeve of insulating material and closely fitting metal sleeve, layer of insulating material located between end plug and bottom of socket; a winding of tape around socket and plug, and an insulator which surrounds plug and socket and in direct contact with tape.

ROASTING FURNACE.—No. 648,183; U. Wedge, Bayonne, N. J.



Roasting furnace combination with roasting chamber, hollow shaft extending vertically through chamber and having air inlets at point below chamber, hollow branch from shaft in chamber, partition across shaft and through branch, hollow arm secured to branch, and having partition corresponding with that of shaft and extending nearly its entire length, series of detachable stirring blades secured to arm, means for rotating shaft, maintaining circulation of air through shaft and arms.

CENTRIFUGAL CONCENTRATOR.—No. 648,088; P. H. Shue, Ouray, Colo.



A centrifugal ore separator, combination with substantially conical-shaped casing having series of discharge openings in bottom and series of upwardly extending elongated collecting and discharge openings in its side leading through side wall of casing, of means for creating gyratory motion of material in casing, water supplies entering the collecting and discharge openings in line with the elongated discharges, and feed entering top of casing.

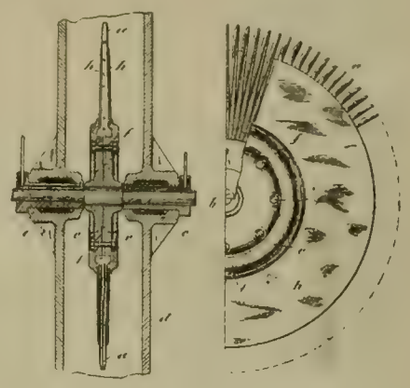
PROCESS OF PRODUCING COPPER ALLOYS.—No. 647,726; G. Palis, Elberfeld, Germany.

Process for producing copper alloys free from gas oxides and other undesirable substances, consisting in following steps: First, melting copper, iron and manganese together; second, adding deoxidizing material thereto; third, adding zinc after deoxidizing material has been absorbed and continuing melting until zinc is volatilized; and, finally, agitating the molten mixture until the gases and oxides have been given off.

PROCESS OF OBTAINING PERMANENT DEPOSITS OF METALS ON ALUMINUM.—No. 647,858; E. Mies, Budesheim, Germany.

A process of depositing metals on aluminum, which consists in boiling the aluminum in solution of mixture of phosphate of metal, free acid and compound capable of attacking aluminum in presence of acid, then washing aluminum and effecting the deposition electrolytically in solution of salt of metal to be deposited.

TURBINE WHEEL.—No. 648,158; H. Zoelly, Zurich, Switzerland.



Combination in turbine wheel of radial buckets separated from each other for portion of their length, each bucket having its receiving face channeled for greater portion of its length, and pair of flat disks inclosing buckets from their inner ends for greater portion of length of channeled part of buckets, they having channels increasing in size from inner end outwardly to within short distance of their extremities, and then decreasing in size to the extremity.

PROCESS OF EXTRACTING ZINC FROM SUBSTANCES CONTAINING SAME.—No. 647,989; T. Ryan, Jr., Flint, and N. Hughes, Bagillt, Eng.

A process of extracting zinc from substances containing the same, consisting in subjecting the substances to action of caustic alkali, the various steps of the dissolving being so carried out that the solution of caustic alkali is brought in contact with several successive portions of raw material, and the various portions of raw material are each successively treated with different portions of caustic solution, precipitating any lead present by galvanic action, securing the removal of organic matters and iron manganese and silicon by the addition of caustic lime and bleaching powder, and finally precipitating the dissolved zinc in the form of zinc oxide or zinc hydroxide by the addition of carbonic acid.

ELECTROLYTIC CELL.—No. 647,960; G. W. Gesher, New York City, N. Y.

An electrolytic cell comprising portion of an alloy of iron and hydrogen, the latter being present in such proportion as to prevent the oxidation (induced, for instance, by chlorine), of iron in alloy, the hydrogen being present in the proportion of about $\frac{11}{100}$ of 1% and upward.

PROCESS OF EXTRACTING METALS FROM THEIR ORES.—No. 648,354; C. G. Collins, Woodsburg, N. Y.

Dissolving out or extracting metals from powdered ore by means of solution of ammonium salt in presence of an alkali base capable of decomposing ammonium salt, and then precipitating the metal by addition of solution of an alkali metal.

Grading Different Classes of Oil.

In nearly every oil field adjacent wells, within 100 or 200 feet of each other, vary materially in the gravity of oil. One well will produce a greater percentum of water with the oil, another a greater percentum of sediment, and consumers who desire to get the best results from the production consider the condition of the oil as it is delivered to them for use. The Los Angeles, Cal., Oil Exchange has adopted the report of a special committee, which practically does away with the different degrees of gravity, so far as the Los Angeles local field is concerned, and classifies the oil entirely as to its purity. The average gravity in the Los Angeles field is 14½°, and it ranges from 12° to 18°. The reason assigned for this basis of classification is that the great bulk of crude oil purchased between 12° and 18° gravity is used as a fuel oil, varying little in character except as to gravity. All crude petroleum between 12° and 18° is graded into four classes, as follows: No. 1, containing not to exceed 3% of water or sediment; No. 2, containing not to exceed 10% water or sediment; No. 3, containing not to exceed 20% water or sediment. Any grade containing above 20% of water or sediment will be graded as No. 4. No special difference in the fuel value of petroleum could be discovered between the gravities of 12° and 18° Baume. To ascertain the amount of water and sediment, the gasoline test was adopted. This test is as follows: From 50 to 100 parts of crude oil have added to them 50 to 100 parts of gasoline, which are well shaken to combine them, and are then submitted to a temperature not lower than 60° Fahr., and the precipitation during twenty-four hours will indicate the classification.

Some Observations on Practice of the Cyanide Process at Mercur, Utah.

NUMBER III.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by WM. MAGENAU, E. M.

As to the metallics, which consist of slivers of zinc with adhering gold, they are fused in ten-gram crucibles in amounts of not more than ten grams of metallics to each charge. The flux used is as follows:

	Grams.
Sodium carbonate	30
Litharge	35
Flour	¾
Silica	3
Borax	Heavy cover
Salt	Cover

When the total amount of metallics is small, say, under 10 grams, it may be all put in the charge, and results conveniently calculated by the formula given in Furman's Manual of Assaying; but if there are more than 10 grams, it is better to take charges of 0.3 assay ton in duplicate, calculating results as shown in the example here given, which will also serve to show clearly the various corrections applied. The proportion of metallics being comparatively small, no corrections except for slag were applied to these, and no account of the silver was taken. As a compensating error, the silver in the metallics offset the losses in cupels, so the "plus buttons" were taken as gold. All figures in the table are in milligrams.

	Gold + Silver	Gold	Silver	Slag Correction	Cupel Correction	Cupel	Inquartation	Corrected Gold
Pulp, .1 A.T.	179.77	178.40	1.37	1.48	.27	.09		180.24
"	179.81	178.27	1.54	1.23	.23	.07		179.80
"	179.82	177.32	1.60	1.92	.25	.08		179.57
"	178.50	177.06	1.44	1.60	.25	.08		178.99
			Av. 1.50					Av. 179.65
Metallics, .3 A.T.	69.00	.....	....	.75	...	...		69.75
"	70.50	.....	....	1.58	...	...		71.08
								Av. 70.41

= 23.47 in .1 A. T.

CALCULATION OF RESULTS.

1796.5 (mgs. in 1 A. T. of pulp) × 322.98 (grms. of pulp in entire sample) = 580233.57 (abstract number).

234.7 (mgs. in 1 A. T. of metallics) × 130.62 (grms. of metallics in entire sample) = 30656.51 (abstract number).

$$\frac{580233.57 + 30656.51}{453.6 \text{ (grms. pulp + grms. metallics)}} = 1346.7 \text{ (oz. gold per ton).}$$

Silver (taken directly from table) 15.0 (oz. per ton).

The purchaser's assay on this same lot was: Gold, 1339.0 oz. per ton; silver, 18.9 oz. per ton. This makes a difference of 7.7 oz. gold per ton in the two results, which was an unusual discrepancy, yet on a 500-lb. shipment whose value would be about $6700, the difference in total value by the two results is only $38.50. The difference in silver is inconsequential.

The question of local refining of product has received much attention in the district at the hands of the larger companies with capital enough to attack a problem which presents so many difficulties and discouragements. A few analyses made by the writer will give an idea of the chemical complexity of the material. These results are taken at random and do not represent average figures, except No. 1, which is an average sample of product from about 20,000 tons of ore, and No. 6, which is an analysis by H. W. Fox, ex-chemist of the De Lamar plant, representing product from over 150,000 tons.

	No. 1. %	No. 2. %	No. 3. %	No. 4. %	No. 5. %	No. 6. %
Au	4.56	5.11	2.35	6.10	5.00	5.26
Ag	.05	.03	.01	.07	.05	Trace.
Fe	1.75	3.00	1.80	1.62	....	Oxides .92
Al	1.00		1.00	....	....	
Ca	3.20	13.70	6.10	1.75	9.50	2.78
Mg	.07	.35	....	....	....	.48
		Total Zn.	Total Zn.	Total Zn.		
Zn (as metal)	38.28	22.00	32.20	55.80	....	55.38
ZnO	35.86	....	....	....	....	16.66
Pb	1.20	....	....	....	....	.53
As	.25	....	....	.10	2.50	.71
Sb	....	....	....	....	....	.07
Hg	.10	....	....	....	....	.31
Cd	....	....	....	....	....	.45
SiO_2	6.10	6.68	21.40	13.77	8.00	2.12
(SO_4)	.03	....	....	....	....	S. .81
						Traces of Bi, Cu, Ni, Te.
Matter soluble in water	.90	....	....	....	....	....
Moisture	1.00	....	....	....	....	....
By difference, cyanogen, oxygen, alkalies, and matter undetermined	5.65	49.13	35.14	20.79	....	13.52
	100.00	100.00	100.00	100.00	100.00	100.00

The partial analyses given in Nos. 2, 3, 4 and 5 will serve to give an idea of the variation in the chief constituents. A consideration of these results will make evident the difficulty of treatment. The one feature of low tenor in gold at once excludes several methods which are applicable to richer products. Direct melting with fluxes would of course be very expensive and produce large amounts of slag requiring rehandling, and probably cause high losses of precious metal. Preliminary treatment with acids on a moderate scale would be high in cost and require more of a plant and better metallurgical skill than most of the plants have been willing to provide. One, however, which had both these requisites (the De Lamar) was able to refine on a large scale by treatment with sulphuric acid, copious washing (to remove Zn SO_4 and Ca SO_4) and subsequent digestion with a comparatively small amount of nitric acid, which removed arsenic and various other impurities, together perhaps with some of the little silver present.

This was carried on until several lives were lost by the accidental mixing of some zinc dust with a waste solution charged with sulphuric acid and arsenic, the result being generation of arseniuretted hydrogen.

Appreciating the danger to operators the method was abandoned and the mill's product sold to smelters, while systematic efforts were made to devise a safe, economical process. This instance is an admirable illustration of the adaptation of theories to practice and of faith in these theories sufficient to involve the expenditure of large sums in experimenting on a large scale—the only way to demonstrate their applicability or unfitness to the case in hand.

An attempt was made to refine by distilling off the zinc in Faber du Faur furnaces after mixing with charcoal and lead (as in the Parkes process for desilverization of base bullion). The auriferous lead was then to be cupelled. This failed on account of the impossibility of reducing the large proportion of zinc oxide present (the product having been muffle-dried before charging into the Faber du Faur) with the temperature it was practicable to attain. The persistent retention of combined water, which caused explosions in the distilling furnace, was also bothersome, and these considerations together with other mechanical difficulties led to an abandonment of the plan.

Various other schemes were evolved, but all presented prohibitory obstacles, and it was decided to return to the original sulphuric-nitric treatment, with various improvements in the mechanical details and very complete arrangements for insuring the safety of operators. A close-fitting hood is placed over the immense dissolving tank and a 20 H. P. fan makes it quite impossible for any fumes to escape to where they might do damage. This plant is now in successful operation and turns out very clean bullion, averaging .950 fine in gold.

The only other recent attempt at local refining was made by the Mercur Gold Mining & Milling Co. in 1899. A somewhat elaborate plant was put up and a few trial runs made, but although it was undoubtedly a technical and financial success, its use was discontinued for reasons not made public. This process, which is patented by J. H. Burfeind of Salt Lake City, is based on the solubility in water of bisulphites of zinc, lime, etc., these being formed by action of SO_2 gas on the material suspended in water.

CHEMICAL CONSIDERATIONS.—To return to the essential operations of cyaniding, a brief statement of a few chemical problems encountered may be of interest. Perhaps the chief of these, and one whose importance cannot be too strongly emphasized, is the determination of KCy in the mill solutions. Nearly every writer on cyanidation has declared the need of a better method for this determination than any now known, but nowhere is this need so pressing as in the Mercur district. The following table gives results of titration of a representative solution by recognized methods which are briefly described in the footnotes. All figures represent pounds KCy per ton of solution:

Method	(a)	(b)	(c)	(d)	(e)
Result	1.1	4.6	1.0	1.4	3.0

In all these a standard solution of silver nitrate was used, its strength being such as to make the burette-reading in c.c.'s equal pounds KCy per ton of solution on a 10 c.c. sample (6.535 grms. $AgNO_3$ per litre).

Ten c.c.'s of solution were taken in each case.

(a) Titrated direct, without dilution, and without any indicator, to first opalescence.

(b) Titrated, after dilution with 50 c.c. distilled water and without any indicator, to opalescence.

(c) Titrated without dilution after addition of a few drops of a 5% solution of potassium iodide.

(d) Titrated after dilution with 50 c.c. water and a few drops of potassium iodide solution.

(e) Titrated after dilution with 50 c.c. water and addition of 1 drop 5% solution of potassium ferrocyanide.

In nearly all cyanide fields differences of a few tenths have been observed, but here we have results varying by several hundred per cent, and it is evident that figures given for strength of mill-solution in use are of absolutely no value for purposes of comparison, even when the method of determination is stated, since it is not known which of these gives the correct amount of KCy.

More important than the actual amount of KCy, is a figure representing the "dissolving strength," as Bosqui calls it, and it is yet to be determined to which of the above results, if any, this is proportional. While all of them vary with the strength of the solution in KCy, they do not vary in the same proportion.

The above results were obtained on a sample of solution which had been used for treating many thousand tons of ore, with, of course, constant additions of KCy and wash water. An investigation was started to determine the cause of differences by the various methods, but before the analysis was completed the sample was lost through an accident, and there was no opportunity for securing another, so the conclusions to be drawn from the following figures are provisional, because based on certain assumptions. At some future time the writer hopes to verify these by analytical results.

ANALYSIS.—Total matter in solution (residue dried to constant weight at 100°C.)—0.27%.

	%
Zn	.062
Ca	.005
Mg	.0009
Fe	Trace
SO_3	.0102
$K_4Fe\,Cy_6$	.0002
KCy S	.0015
Cy	.092 (see note a)
Combined water (see note b)	.0018
K (see note b)	.1000

Alkalinity (expressed in number of c.c.'s $\frac{n}{10}$ acid required to neutralize 100 c.c. solution, using methyl orange indicator) 19.6.

Note (a). By Sharwood's method of titrating with $Ag\,NO_3$ solution in presence of ammonia and potassium iodide. (See Jour. Am. Chem. Soc., Vol. XIX, No. 5.)

Note (b). These two results are assumed as being the probable composition of the difference between the sum of ingredients already accounted for and the total solids in solution.

Methods (b) and (d) gave the sharpest end points, and one or the other of these is used in the mills of the district, although, as previously stated, it is not known that either of them give results strictly proportional to the dissolving strength. Considering the theoretical correctness of the methods, as expressing the amount of actual KCy present, a study of the analysis, as far as its incompleteness allows, leads to the conclusion that method (d) is nearest correct. As to an explanation for the wide discrepancies none can at present be offered, and may be found to lie in the presence of some complex organic compounds now unsuspected.

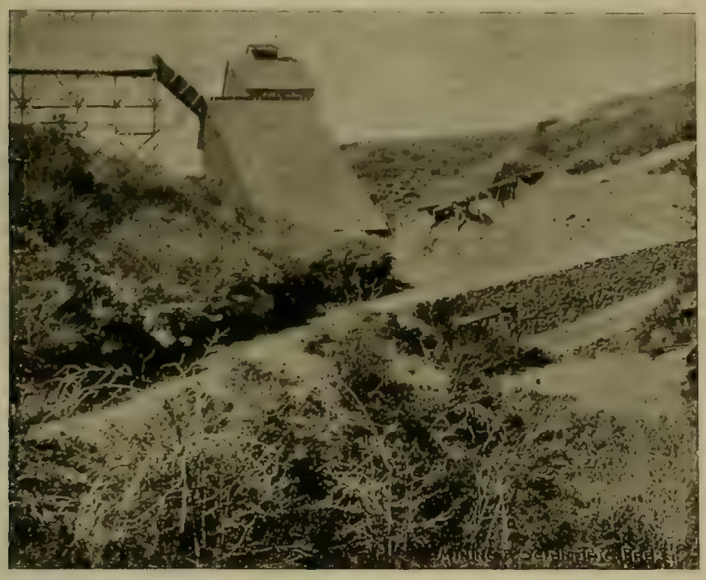
It is frequently stated that the above-mentioned recognized methods are all that are needed in practical millwork so long as any one is adhered to throughout, and this is sometimes true after actual trials on the large scale have taught the operator what the result means on his own particular solution, but such large-scale experimenting is very costly, and the writer has several times seen hundreds of pounds of cyanide sacrificed for want of an accurate analytical method, while very possibly there is a constant unseen waste on the same acccount.

The matter of adding quick or slaked lime has received general attention and in some cases been found to be a positive sine qua non. Alkaline washes are not used.

While much of the ore does not show a noteworthy amount of acidity by the ordinary test, which, by the way, is of little use in gauging the amount of lime to be added, a general good effect is observed by the admixture of from ½ to 2 or 3 pounds of lime per ton. The precise chemical action is not known; but, as a general thing, the consumption of cyanide is reduced and the precipitation improved. It is often by this latter operation that the amount to be added is judged, the activity of the zinc being proportional to the alkalinity of the solution. In one mill it was found necessary to use as much lime as twenty pounds per ton to obtain clean precipitation, which latter was also accompanied by several curious phenomena, among them the deposition of the gold in bright metallic films, and this from extremely poor solutions. This occurred especially when the alkalinity of the solution fell below a certain point and seriously impaired further precipitation.

SILVER CYANIDING.—There are but two silver cyanide mills in the district—the Northern Light and Chloride Point. A considerable tonnage of ore ranging from two to twenty ounces in silver per ton has been treated, and there seems to be no technical difficulty. The general system used is the same as for local gold cyaniding, with the difference of stronger solutions and longer treatment. Zinc-shaving precipitation is used and a very high-grade product is obtained, the solution being about 100 times as high in metallic contents as the solution in gold mills.

The percentage extracted from the ore is lower than for gold ore, being from 60% to 70%. As experienced in other fields, the silver dissolves in the same proportion as it is present as chloride.



Helvetia Hoist and Mill Near Julian, Cal.



Gold King Mill, Banner, Cal.

(See Page 494.)

As to Ore Testing.

There are assayers who believe the prospector should be "encouraged" by overstating the value of his ore and who habitually give small returns, from a "trace" to a few dollars a ton, upon ore which they know to be barren, thinking to keep him at work upon a prospect which will yield nothing, spending valuable time and money to no purpose, save that of giving a few dollars worth of work to the assayer. Perhaps the prospector sends samples to two different assayers, and one returns him "no trace" while the other gives him a value of a few dollars per ton. The biggest return is usually accepted as correct, and the "no trace" man is charged with a failure. Some assayers say it makes no difference whether they return "no trace" or a dollar or two a ton, because in neither case is the ore of any value, but the accuracy of an assay of ore of very low grade is more important than that of an ore carrying a hundred dollars per ton; in the first case a difference between "no trace" and a dollar or two may decide the expenditure of hundreds or perhaps thousands of dollars in development, while in the latter, the ore will be shipped anyway; and all know that the smelters will pay for nothing but the actual contents of the ore. These returns of value from valueless ore are often the result of accident or carelessness in the hands of an assayer who has every intention of being honest. A particle of rich ore in the grinder left from the last sample, a salted crucible, a loaded cleaning brush, a dirty mixing cloth, fluxes containing a little precious metal, these and other matters of carelessness, uncleanliness or disorder about the laboratory make the difference between reliability and worthlessness in the result of assaying. The general public is not competent to judge of the qualifications of an assayer any more than those of a physician. Any man may buy an outfit for $100 and stick out his shingle "Chemist and Assayer," when in reality he knows nothing about the correct application of the principles underlying the trade he professes. Such instances are more common than many would believe, and sometimes people of intelligence who would at once realize the foolishness of hunting out the cheapest lawyer or doctor will give their patronage to such an assayer just because they can get his services a little cheaper than those of a man who is competent in his profession and who realizes the importance of taking pains.

A good assayer is often charged with failure because his customer is ignorant of the first principles of sampling ore. Sometimes a piece of rock is broken in two, the halves sent to different assayers, widely varying results are obtained, and one of the operators is charged with an error, when in fact both are correct, and the results are chargeable to the fact that the metal was evenly disseminated through the sample. It is well to remember that like results can only be reasonably expected when the sample is finely crushed, thoroughly mixed and carefully divided. The careful miner will treat his sample in this way, grinding as fine as his circumstances will permit, mixing and dividing carefully, and in every case reserving a portion of the sample so that a check assay can be made if desired. As the best men are liable to an occasional mistake, no conservative miner will expend any large amount of labor or money upon the result of a single assay, but will base his future work upon the concurring results of two or more reliable assayers.

The best practical test of the qualifications of an assayer is his ability to check with the smelters on their shipment pulps, and if you are in doubt with whom to trust your work go to your friends who are ore shippers and get them to tell you who they patronize. No man can be honest in this business without making many enemies among those customers who have had higher assays elsewhere than he can give them and who had rather believe their assayer dishonest or incompetent than that their ore is less valuable than they hoped. Remember that good men as a rule can get a fair price for their work. If there is any trade in which "cheap" work is utterly valueless it is in that of the assayer.

Union Steam Pumps.

The two illustrations herewith are from patterns of the Union steam pump made by the Union Steam Pump Co. of Battle Creek, Mich. Fig. 1 is intended to show how the inside of the pump would look were the shell made of glass instead of iron. The steam valve in its relative position as regards the piston; the trip steam tube attached to the piston head, and its accompanying reservoir into which it slides and from which it takes its steam with which to trip the valve, also the guide pin upon the piston head to keep the piston in one position and prevent turning of the rod when packing the water end. The cut also shows how the valves, water courses and other openings appear in their relative positions as regards the other parts of the pump. The "phantom" shows the whole pump with air chamber. Upon a small cut of this kind the upper openings cannot be shown, but the reader will bear in mind that, through proper portings, the piston head, which is double, having in its center a periphery or channel, guarded by expanding steam rings, is always charged with boiler pressure steam, which at each stroke registers with a port leading into and in front of the valve head, exerting a boiler pressure force to throw the valve in advance of the finish stroke of the main piston; boiler pressure being eighty pounds, this relative pressure is exerted on each square inch of surface on the valve head.

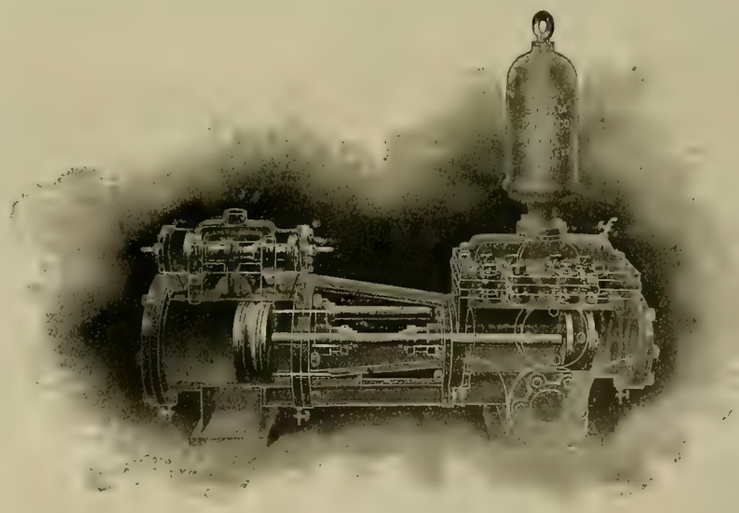


Fig. 1.—Union Pattern "Phantom."

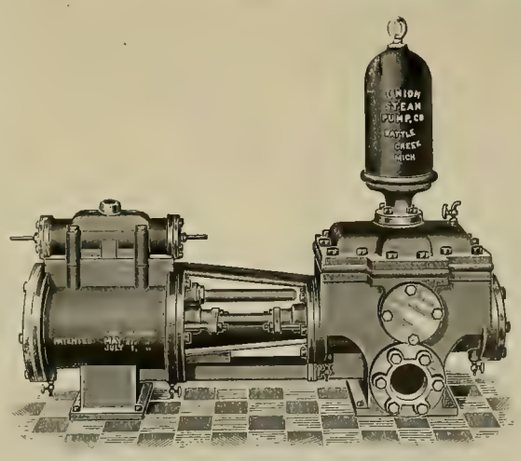


Fig. 2.—Union Pattern, Size 8½x5x10.

Fig. 2 is an ordinary view of the same pump. A handsome illustrated catalogue will be sent upon request to any address by the makers.

At Washington, D. C., this week the House Committee on Public Lands decided to report favorably Commissioner Hermann's substitute for the De Vries California mineral lands bill.

Lead Supply and Demand.

New uses have been found for lead. One of the most important is that of constructing storage batteries for all motor carriages run by the motor carriage system; that each motor carriage carries on an average of 300 pounds of lead. The construction of underground conduits for the use of telegraphic, telephonic and other companies has caused a large absorption of this metal and will continue to do so. As cities and towns increase in business and importance the demand will increase, as it is a metal for which it is not easy to find a practicable substitute. But while these new avenues for the consumption of lead are being opened and the absorbing power of this country and of the world is steadily increasing, there has been but little increase in the output of lead products. Nor is there likely to be much of an increase. Silver mines carrying lead which were closed down on account of the low price of silver are not likely to be opened up to a disturbing extent of the market unless there should be a sudden rise in the value of silver bullion, which is not likely.

MINING SUMMARY.

ALASKA.

Forty Mile river is to be diverted from its channel this summer and turned into a canal 40 feet deep and 60 feet wide, which five Americans have been digging for fifteen months past. They expect to complete it this summer for a distance of 200 feet and lay bare nine creek claims.

Charles W. Garside writes from Cape Nome: "Nome City, Jan. 14.—Have completed a survey of the first section—Fort Clarence to Fort Safety, 114 miles—of the Alaskan & Siberian Railroad, Kaltag, on the Yukon river, to Point Spencer at Point Clarence. Started Nov. 15; completed the survey Jan. 11. We had thirty-five Siberian dogs, five Siberian sleds, Siberian dog drivers, ten men and a cook. Have had little time to spend on the creeks. Nearly all the creeks were located before we arrived on the ground, mostly by power of attorney. The country is not as rich as Dawson, but much more easily worked, being very shallow. Our expenses since arriving at Nome have been a little over $4000. Everything is very expensive—coal $150 a ton, lumber $300—but there is not as much shortage as has been reported."

A new mining district is reported north of Nome and east of Cape Prince of Wales—the Kanowgok mining district—the rivers and streams flowing into Bering sea. Eight claims are located on Bituk creek, which flows into Port Clarence, by men grubstaked by J. J. Healy last fall.

In a letter written at Nome, January 13th, H. Leland says: "The whole country is staked from one end to the other; and every claim which was known to be of any value, and also hundreds of them which never had a pick stuck in them, were staked and restaked until some of them had as many as twelve and fifteen different stakes on them. There are no three people in town who have the same time, and the different people who staked the same property claim were there at 12 o'clock on the night of December 31, 1899. Some claims were restaked on the ground that the assessment work had not been done, some that the original stakers were aliens and all sorts of other reasons were given, the result being that when spring opens there will be no end of litigation, and the lawyers will reap a harvest."

ARIZONA.

COCHISE COUNTY.

The Prospector hears the Copper Queen Co. at Bisbee have opened up a rich body of ore in their new working shaft, that they are now sinking upon the Spray mine. The company chose the spot upon which this shaft was started because it was believed they would encounter no ore here. They desired to have solid limestone all the way down, that the shaft would remain more substantial than if sunk in ore that might afterwards be worked out from around the timbers, interfering with their alignment. The shaft is down 550 feet, a four-compartment shaft 24 feet in length and 8 feet in width. At this depth the entire shaft is reported by the Prospector to be in copper ore that runs 50% and is also rich in silver. This shaft is about three-fourths of a mile south of the Copper Queen smelters.

COCONINO COUNTY.

(Special Correspondence).—Along the Colorado, through southern Utah and northern Arizona, from where Dirty Devil river empties into the Colorado to this place, 150 miles, a New York company, managed by R. B. Stanton, will dredge, starting this summer. The Bucyrus Co., South Milwaukee, Wis., has built them a dredger to daily handle 2000 cubic yards gravel. The part prospected shows an average of 20 cents. This season the dredger will be run by a gasoline engine. The intent is, if it pays, to put in an electric plant and another dredger and work both by electric power.

Lee's Ferry, April 25.

GRAHAM COUNTY.

The Lone Pine group of mines is reported sold to the Turn Bull Syndicate of Safford for $20,000. The property is 15 miles south of Ft. Thomas. It is a copper proposition, carrying ore about 30%.

Jno. Belser will superintend operations of the Rockwell M. Co., which has bought a group of claims in the Aravaipa district.

The Mount Turnbull Copper M. & S. Co. have begun work on their Copper Bell property.

MARICOPA COUNTY.

The O'Brien mine, at Gilbert, near Wickenberg, that Brown & Co. have bonded, is having two tunnels driven and a shaft sunk. The company has forty men at work. They have a 22 H. P. gasoline engine in place and connected up, and will run their 10-stamp mill and concentrator. The water supply is 2 miles away and is pumped by a 12 H. P. gasoline engine.

MOJAVE COUNTY.

Post: At Chloride the Cannon-Minnesota mine is treating 200 tons of ore each twenty-four hours. The ore body is of a size to put on three eight-hour shifts of men.

The strike at the Pay Roll mine is holding out. The new ore body is in a 175-foot east drift from the 300-foot shaft, 6 feet wide. Three shifts of men are engaged on this part of the mine. Mgr. C. Timmons has ordered a 100-ton concentrator, to be in operation June 1.

The Lucky Boy mine is yet in its body of "mahogany" ore. Three shifts have been at work since it was first broken into and shipment of one carload a week has been made. The Lucky Boy belongs to a Chicago company, who bought it last summer from J. Smithline for $15,000.

YUMA COUNTY.

Treating the tailings by the cyanide process at Harqua Hala some years ago was of resultant profit. There was a saving of 76%. The cost of the treatment of the tailings is here given in detail:

Supplies—	Per ton. Cents.
Cyanide of potash	26.63
Fuel	12.87
Lime	4.40
Zinc	0.61
Sundries	1.55
Tramway and engine repairs	1.18
Packing, waste and lubricants	0.66
Assay office	2.42
Freight and express	3.84
Telegrams and postage	0.76
Stables	5.06
Total	59.98
Add water supply	9 87
Royalty	10.00
Total	79.85

Labor—	Per ton. Cents.
Superintendent and foreman	7.29
Experts	3.32
Shift boss and helpers	8.04
Assayer and melter	3.92
Mechanic and engineers	8.59
Firemen and mine pumper	5.63
Carmen and crushermen	5.35
Signals, tailings and scrapermen.	7.06
Stables, watchmen, blacksmith and woodpiler	5.38
Total labor	54.58
Add supplies	79.85
Legal expenses	1.73
Taxes and insurance	4.45
Total cost	140.61

The total yield was $3.21 per ton, leaving a profit of $1.80 per ton of tailings worked.

CALIFORNIA.

AMADOR COUNTY.

At Sutter Creek $70 ore is being treated at the Zecla mill from the Central Eureka. The shaft is now nearly 1700 feet deep.

At Jackson the new vertical shaft of the Kennedy is to go 3000 feet; it is now down about 1200 feet.

At the Newton copper mine a reduction works and a large force of men are talked of.

At Amador City, the Fremont Consolidated mine shaft is being unwatered. The Gover will be unwatered this season.

At the Pocohontas mine, Drytown district, sinking has been resumed.

The Centennial mine shaft at Drytown is down 630 feet. The ore shows some free gold and the sulphurets are high grade.

CALAVERAS COUNTY.

H. J. McSorley is superintending sinking operations at the Camanche G. M. Co.'s gravel mine on the Mokelumne river, below Camanche. Bedrock is expected at 215 feet. In the river bed at that point in the early fifties, the Prospect says, several tons of gold in all were taken out.

The Cook mine at Campo Seco, owned by the Standard Oil Co., has a new 10-stamp mill, just completed, which began crushing this week.

Ben and Lewis Williams, the men who made the Copper Queen mine at Bisbee, Ariz., have bought a California property—the Old Napoleon, near Milton—and will proceed to make a mine of it. The shaft filled with water in 1865, and nothing has been done for thirty-five years. Messrs. Williams will unwater it, put in suitable machinery, and have sent for their old foreman, John Andrews, to take charge of the work.

EL DORADO COUNTY.

The Georgetown Gazette hears that the Big Sandy mine at Kelsey will start up again with J. Kelley as Supt.

KERN COUNTY.

At Randsburg the Red Dog mill is working on 300 tons of West Shore ore.

The Butte, under Supt. Miner, is turning out 300 tons at $18 per ton.

Mining Review: Willard & Hammond have cleaned up $2750 from the Val Verde. It went about $13 per ton.

Bakersfield Californian: The first flowing well to be bored in the Kern river district has begun to yield up oil by its own efforts. The well is the San Joaquin Co.'s No. 5 on section 5, 29, 28. Lower oil-bearing stratum has been penetrated and 328 feet of the sand obtained. Subsequently it was sand pumped, which work was continued up to date. When sufficiently cleaned the oil began running over the casing and is now flowing at the rate of twenty-five barrels per day.

MARIPOSA COUNTY.

The Boston News Bureau, published where the stock is owned, says that at Coulterville new ore shoots have been discovered at the Merced properties besides the Mary Harrison gold ore shoot, upon which a shaft is now being sunk to the depth of 1000 feet, and that the management feels encouraged.

NAPA COUNTY.

(Special Correspondence).—Near here is a deposit of white carbonate of magnesia 6 feet thick, imbedded at an angle of 65° between walls of serpentine and talcose schist.

Rutherford, May 2.

The Ætna Con. Q. M. Co. reports that it owns 350.48 acres land and 578.32 acres mining claims, with reduction works at Lidell; capital stock $500,000. For the year ending December 31, 1899, total receipts from sales of quicksilver were $154,552; total expenses, including $2679 for repairs and construction and $2366 for depreciation, $86,190; net earnings $69,058; dividends $50,000; surplus $19,058; adding balance of $56,532, brought over from previous year, made total surplus at close of year $75,590. The mining statement is as follows:

	1898.	1899.
Tons ore smelted	18,394	18,084
Quicksilver produced, flk's	3,450	3,800
Quicksilver produced, lbs.	263,925	290,700
Metal obtained, %	0.72	0.80
Drifts and tunnels run, ft.	2,385	2,740

Receipts were $8.58 per ton smelted; expenses $4.76; profit $3.82.

NEVADA COUNTY.

Sedimentary rocks, chiefly referred to the Calaveras formation, occupy small, usually narrow and long areas imbedded in the predominating igneous masses. Granodiorite occupies a large part of the Nevada City and Banner Hill districts, while a small massif of the same rock is found in the Grass Valley district. Large areas of diabase, porphyrite and brecciated forms of these rocks surround and separate the granodiorite areas. In the southwestern part of the Nevada City district and the northeastern part of the Grass Valley a large and complicated massif is found, consisting in part of diorite, in part of gabbro, pyroxenite and serpentine. The slates of the Calaveras formation are the oldest rocks. Next younger are the diorites, gabbros and serpentines. Still later are the diabases and porphyrites, and the intrusion of granodiorite closes the succession of igneous rocks.

The bedrock series is, as usual, in places covered by several hundred feet of Neocene gravels and rhyolitic and andesitic tuffs, the gently sloping top of the andesitic ridges forming a principal feature of the landscape. The Neocene auriferous gravels have been extensively worked in the Nevada City and Banner Hill districts, both by the drifting and the hydraulic processes, and considerable ground still remains which probably can be profitably worked. The gold quartz veins are numerous and belong to several distinct systems. They are found in any of the ordinary formations, and generally cross the contacts without change. In the Banner Hill district the veins are narrow but rich, and have a general east-west direction and a northerly or southerly dip.

In the Nevada City district the quartz veins have a general north-south direction and an easterly dip of about 45°. Large dislocations producing overthrust faults have occurred along several of the veins. In the Grass Valley district there is one system with a west-northwest direction and a steep northerly or southerly dip. On this system the Idaho mine is located. Most of the veins in the central and southern part of the district have a northerly direction and a flat easterly or westerly dip. The veins are often accompanied by strongly developed sheeting of the country rock.

Near the Brunswick, at the Union, E. C. Creller has erected a plant larger than the Brunswick's; he has a 16-inch pump, with heavy driving machinery. The spur wheel weighs fourteen tons. Preparations are being made for the erection of a mill. Both these mines have large ore veins and the rock is good.

Herald: The hoisting and pumping plant at the Brunswick mine, Grass Valley district, is the old rig of the Justice mine, Virginia City, Nevada. The spur wheel on the pump rig weighs thirteen and one-half tons. The bob runs a 14-inch plunger pump.

Union: The fourth installment on the purchase price of the Nevada City mine by the Champion M. Co., $8000, is paid. The next payment will be the last one. The property will then be held by the Champion Co.

PLACER COUNTY.

A special meeting of the stockholders of the Pioneer G. M. Co. will be held May 31 at Helena, Mont., when a proposition will be laid before the shareholders looking to the raising of a sum sufficient to carry on development work.

PLUMAS COUNTY.

At the Hallsted mine men are preparing for building the 20-stamp quartz mill, a boarding house and other quarters.

Mgr. Andrews is expected to resume work on the Rich Bar mine this week.

RIVERSIDE COUNTY.

The Lost Horse mine, Pinon mining district, has been bonded to U. S. G. Todd of Los Angeles for $200,000, says the Express. The owners of the mine, Ryan & Kelsey, have agreed to accept $100,000 April 25, 1901, $50,000 October 25, 1901, the remaining $50,000 April 25, 1902. Mr. Todd expects to secure water supply from springs that he owns six miles from the mine. A company is to be organized to operate the property.

SAN BERNARDINO COUNTY.

Ore from the Old Shoes mine at Manvel assays $32 in gold, silver, copper and lead. G. O. Pearse says he has sold the Old Shoes and other claims for $20,000 to T. A. Garey of Los Angeles.

At Gold mountain sixty men are preparing for the 40-stamp mill. It is locally asserted that, if the mine proves what it promises, the 40 stamps will be followed by 100 more. The supplies are taken in by way of Victor. The batteries and some parts of the old Baldwin mill are being utilized in the construction of the new mill.

SAN DIEGO COUNTY.

(Special Correspondence).—Julian district, which has had its ups and downs for thirty years, is fairly active. The slate formation of this district is noticeable. There is a peculiar vein structure as noted in the Ready Relief mine, where the ore is a silicification of mica slates crumpled into complex folds. A photo is sent of the Helvetia hoist and mill (see page 493). At the mouth of this mine thin-bedded argillaceous slates strike north 75° west magnetic, and dip 70° northeast. These slates are hard and tough. In the tunnel the slates are soft and can be worked with the pick alone. The mine has had varying fortunes, being owned by local people, then a Los Angeles company, then the Pacific Bank of San Francisco, later by local people again. It has yielded about $500,000, and with proper tunnel development could probably be made a producer again. It is to be actively worked this season.

Dr. Stanley has moved his cyanide plant from Banner to Mesa Grande.

In the Banner district D. C. Collier Jr. has bought for $10,000 the Cincinnati Belle and Gold King. The latter is of some note, having yielded quartz ore going $100 a ton. With this is a photo of the Gold King mill (see page 493), which is 11 miles from Banner, which has crushed for the Cincinnati Belle and Gold Queen, an adjoining mine. The Gold King mine is 4 miles southwest of Banner. Like nearly all the other mining properties in this section it has changed hands quite frequently, and like the others, needs only capital and intelligent development to be made a good paying property.

At Julian the Owens is yielding well. The Kentuck S. tunnel at Banner is in every way favorable.

Julian, April 5.

At Hedges at the Golden Cross M. Co.'s property last week a blast of 115 kegs of powder was set off and shattered several tons, to be gathered up for the mill.

SAN LUIS OBISPO COUNTY.

The Adelaide quicksilver mine is sold to the K. K. Q. M. Co. for $50,000. It was formerly owned and operated by A. Dubost.

SHASTA COUNTY.

D. B. Hunt has taken a six months' development bond on the Hiatt mine, Buckeye district.

The Donkey mine, Furnaceville district, has been bonded to Tibbitts & Shannon. The bond requires $12,500 August 1, 1900, and $12,500 at the end of twelve months.

In Churntown mining district Wolf &

Sleiger are shipping ore from the Arab mine to the Keswick smelter.

Searchlight: At the Mountain Copper Co., Iron Mountain, the pay of the timbermen is increased from $2.75 to $3 per day; machine men, $2.75 to $2.85; miners, $2.60 to $2.75; muckers, $2.10 to $2.50; laborers, $1.90 to $2.

Free Press: There is considerable activity at the Hart mine in Old Diggings, now under bond to the Texas M. Co. The ore is sorted and shipped in sacks by team to the Keswick smelter. The extension of the wire ropeway across the Sacramento river to the spur on the main line of the S. P. Co. is completed. H. C. Woodrow is Mgr.

SIERRA COUNTY.

Supt. W. B. Dunlap will resume operations at the Alaska mine, Pike City. He proposes to put up machinery on the old works and pump out the shaft.

SISKIYOU COUNTY.

At Mill creek the Gum Boot mine has twenty men employed. The mill is busy day and night.

Parker & Smith, near Summerville, have two giants at work; there is plenty of water to last till July.

J. Panter of Chicago has a steam drill prospecting gravel ground in the old Hop Lee mine. Should the prospect prove satisfactory, a dredger will be built.

Journal: Copper mines in Preston Peak district, on the Siskiyou and Del Norte county boundary line, are attracting interest, several claims having been taken up.——Prospecting for dredger operations on McAdams creek is progressing.——Mgr. Baker will start work on the Cherry Hill quartz mine, at Cherry creek, on a bond.

TUOLUMNE COUNTY.

Twenty-five men are working at the Kanaka. The mill is in operation.

F. Deidesheimer has bonded the Two Brothers mine, near Groveland.

At the Santa Ysabel operations have been suspended pending the special meeting of the stockholders on the 30th inst., when consideration will be given to a reorganization of the company, involving an assessment of $1 per share on the stock. Properties adjacent to the Santa Ysabel continue to make good reports.

Democrat: The Starr King mine, three and one-half miles southeast of Carters, is to be opened up and operated.——The Poison Oak mine is to have a mill. Supt. Spatz will select the machinery.——The bodies of rich ore struck in the Jumper mine hold out, and the April yield was large. The general offices of the company are now located at the mine.

Independent: The twenty stamps at the Confidence are busy.——The main shaft of the Rawhide will soon be 1800 feet deep.

COLORADO.

BOULDER COUNTY.

Jas. Tonkin is to operate the Struggler mine near Ward.

The Delano mill (formerly the Atlas Reduction Works) is now running to its full capacity.

At Frances three eight-hour shifts are driving the Adit and Ni Wot tunnels and two shifts are working in the Dew Drop. The Ni Wot tunnel is in over 1800 feet from its connection with the Adit tunnel. The latter tunnel is in over 3900 feet.

T. R. Mann, of Boulder, has bought the American mine at Sunshine. After the oxidized ore was worked out and the sulphides were reached at water level, the mine was closed; operations then resumed and a body of low-grade milling ore was found, running from $12 to $15, which will be treated at the Culbertson mill at Boulder.

CLEAR CREEK COUNTY.

Near Empire, Ohio men have begun systematic development of the Maud S. mine. The Post says ore is being stoped in a drift running 200 feet on the vein from the point tapped by the upper crosscut tunnel, and shipments of three carloads, one of solid, two of concentrating stuff, exhibit the usual character of the Douglas mountain product—that of the silver-lead carrying about $5 in gold to the ton.

Tellurium ore has been found by J. W. Shaw on the Nonpareil, near Idaho Springs. The streak is 3 to 4 inches wide, and assays up to $10,000 a ton.

CUSTER COUNTY.

The Bassick mine has been unwatered, the shaft retimbered and sunk to the 1300-foot level, and a drift started from the latter level to cut the ore body.

GILPIN COUNTY.

The Gower Mines syndicate is operating the Running Lode near Black Hawk.

LAKE COUNTY.

The Home Co. is daily shipping 400 tons of ore, a large proportion of it high-grade chlorides.

The Nil Desperandum, on Rock hill, has reached the contact at a depth of 640 feet. The ore runs 25% lead and about forty ounces in silver per ton.

Work is to be resumed on the Sedalia, Little Ellen hill. A station will be cut this week, when the shaft will be 80 feet deep.

MONTROSE COUNTY.

Near Bedrock, the La Sal M. Co. has finished driving through 50 feet in length of its tunnel in ore, which is 16 feet in width and carries 60% copper and 200 ounces silver, besides gold values. They are shipping the ore to the Argo smelter in Denver. This mine is in sandstone.

SAN JUAN COUNTY.

Post: Silverton ore shipments are increasing, now being twelve cars of concentrates, representing in crude ore 650 tons per day, the concentrates average value being $75 per ton.——The Gold King has added forty stamps to the mill.——The Iowa is completing a new tramway.——Mgr. Terry of the Sunnyside is in Denver purchasing stamps to put in the new mill at Eureka in place of the speed rolls.——In Arrastra basin about 450 men are employed on the Silver Lake, Iowa and Tiger mines; this force will be increased until by June 15th 650 men will be at work in the basin. The Silver Lake is shipping four cars of concentrates per day —fifty tons.

SAN MIGUEL COUNTY.

E. E. Bassett is shipping ore from the Silver Bell, and J. B. Tendrick from the Attica, near Ophir.

Near Telluride, the first clean-up at the new Bessie cyanide plant was satisfactory. A new cyanide plant is being built upon the San Miguel river, twenty miles below Placerville. R. Burns is Gen. Mgr. Mgr. Casey is operating at the Keystone placer property. It is calculated 1000 yards will be handled per day. About 100 feet more riffles are added. Below these riffles a grizzly has been put in the bottom of the big sluice, all the finer sand and dirt sinking through this and passing through another sluice with Hungarian riffles.

SUMMIT COUNTY.

Near Breckenridge, the Gold Pan Co. is testing gold gravel.

J. H. Myers has returned to Frisco from Chicago, where he organized a company to drive a tunnel near the Excelsior mine to develop a group of fourteen claims.

TELLER COUNTY.

(See illustration front page.)

(Special Correspondence).—With this is forwarded to you a view of the plant of the Economic Gold Extraction Co., near Victor, in Cripple Creek district. The plant is controlled by the Wood's Investment Co., and operates on ores from the Gold Coin, Jack Pot and other mines operated by the Wood people under various corporate names.

Power at the Economic mill is supplied by the La Bella electric plant at Goldfield and by the Colorado Electric Power Co.; but before the end of this year the power will doubtless be supplied by the Pike's Peak Power Co., whose electric plant is being built on Beaver creek, twelve miles from Victor, the same also being a promotion of the Wood's Investment Co.

In the mill are eleven motors, aggregating 300 H. P. It is claimed the division of the power by this number of motors obviates the necessity of having so much line shafting as would be required with the power centered in one or two motors, and also reduces the friction.

The ore is carried from the bins by belt conveyors to the crushing floor, below which are a series of gyratory crushers, the product from which is elevated and automatically sampled and carried to the drying bins, the heat for the latter being supplied by the waste heat from the roasters. From the driers the material passes, by conveyors, to the coarse and fine rolls, of which there are six sets, 16x36 inches, reducing it to not less than 16 mesh, though much of it is a great deal finer. In this dry, pulverized condition the ore is conveyed to the roasters, of which there are seven of the Argall cylindrical, revolving, four-compartment pattern, each 37 feet long, tile-lined. The heat is from coal, fed automatically by stokers, and with blowers to accentuate draft and drive the heat to all parts of the roasters. Each roaster has its own cooling device, beneath the roaster floor, the latter being of cement and metal arches, making it fireproof.

From the roasters and coolers the material passes by elevators to bins above the chlorinating barrels, where it is weighed by portable scales. There are seven chlorine barrels, each 7 feet diameter by 17 feet length, with capacity of eighteen tons. They are, perhaps, the largest barrels made, and were turned out by the F. M. Davis Iron Works of Denver.

The barrel solution containing chloride of gold passes to a system of lead-lined tanks, in which sulphuretted hydrogen is used as a precipitant, producing a sulphide of gold. After collecting in filter presses the process is completed in the refinery, where gold bars are produced. The reduction plant is under the general superintendence of W. A. Watson.

Victor, April 21.

The Proper G. M. Co., Cripple Creek, has sold to R. Schwartz the Proper, Occidental, St. Clair and a half interest in the May-Be-So and Chance lodes for $90,000.

J. F. Burns, Pres. Portland mine, says: "We will be forced to close the mine very soon unless we are able to obtain pure water. There is so much lime in that pumped from the mine it has ruined the boilers. The loss to the community will be quite serious. We have a payroll of about $37,000 a month. The property is outputting 1500 tons of $100 ore per month. The ordinary expenses, aside from the payroll, are $25,000 a month."

The Modoc M. Co. will sink a new double-compartment shaft in the center of the Ocean View claim, 5x15 in the clear, to a depth of 1000 feet.

The Van Fleet sampler, near Victor, has been bought under a three-year bond and lease for $30,000 by a company to be incorporated as the Co-operative Sampling Co. by E. M. Lamont, E. W. Ray and S. M. Burtis.

The Milliken lease on the Rattler on Raven hill has been thrown up and the machinery removed.

At the 250-foot level the Winslow Co., leasing the Triumph, Battle mountain, has ore of better grade, 4 feet wide, and an assay giving $640.

Post: Stratton's Independence is outputting from 175 to 200 tons of smelting grade a day. No ore was sent out for seven days. The manager is endeavoring to make the April production equal the average monthly production for the last six months. The average has been about $250,000. Stratton has been paid his $10,000,000 by the English company, and now has nothing to do with the mine.

IDAHO.

ADA COUNTY.

Boise reports that promoters of the Atlanta mining deal have succeeded. It takes in nearly all the mines on Atlanta mountain, including the Petit property, and involves the expenditure of about half a million dollars.

CUSTER COUNTY.

(Special Correspondence).—Herewith I send you a view of the Lucky Boy G. M. Co.'s mill at Custer City (see front page). The mine is located at a point higher up on the mountain, which is connected with the mill by a tramway line 8000 feet long. The company's holdings comprise a group of seventeen claims and is the result of a consolidation of several groups which formerly worked separately. The main workings are through a 600-foot shaft on the Lucky Boy claim. The vein, carrying siliceous, gold and silver-bearing ore, is in syenite-porphyry formation, has an east and west trend and a dip to the north. About fifty tons per day are milled, the proceeds being $15 to $20 per ton, about 65% of which is gold, the balance silver. The process is wet crushing, with copper amalgam plates, Wilfley tables for concentration; also canvas tables and a cyanide plant for the tailings. Some portions of the property have been worked for sixteen years, making a production record of $8,000,000. The stock of the company is held by Messrs. McCormick, Hanauer and N. Treweek of Salt Lake City, the last-named being president and manager. The superintendent is H. A. McCormick. Twenty stamps are now at work, the tailings being cyanided.

Custer City, April 17.

IDAHO COUNTY.

At Pollock, Mgr. Hollingshead of the Utopian M. & M. Co., is operating seven claims, and says he has sufficient gold-copper ore in sight to warrant the placing of a concentrating plant.

OWYHEE COUNTY.

Supt. Jenkins of the Cumberland says the new mill is running satisfactorily. The completion of this mill brings the amount that the company has spent in putting the mine on a working basis up to $100,000.

The Dernier Resort M. Co. has incorporated to operate three claims on War Eagle mountain, near Silver City; capital, $200,000.

SHOSHONE COUNTY.

The Morning M. Co. at Mullan will take water to the mill, where an electric power house is to be put in.

At Wallace, the stockholders of the Sonora M. & M. Co. have declined a proposition to sell the controlling interest in the property of A. B. Campbell on a basis of $35,000 for the entire holdings, and have decided to go ahead and develop the property.

In the Hunter mill at Mullan the ore is brought from the mine on a bucket line, three-quarters of a mile. The buckets carry 250 pounds and bring down ten tons per hour. They are dumped by hand upon grizzlies. The Hunter concentrates are free from zinc. The amount of iron is such that the concentrates sparkle with the cubes of iron which go through attached to pieces of galena. The Hunter concentrates runs 50% lead and sixty to eighty ounces of silver per ton.

WASHINGTON COUNTY.

The Blue Jacket mine is reported shipping copper ore to New York, from a depth of 375 feet, at a profit of $105 per ton.

MICHIGAN.

HOUGHTON COUNTY.

Marquette trimmers of iron ore say if they do not get $3.50 a day a strike will follow. Over 3,000,000 tons of iron ore are to be handled this season.

News Bureau: The sworn statement of the Tamarack M. Co. shows that the company produced in 1898, 19,962,545 pounds of refined copper as the result of an output of 31,127,623 pounds of mineral equal to 63.17%. In 1899 the output of mineral was 31,713,752 pounds, which, at 63.17%, would give a product of 20,033,576 pounds of refined copper. Total receipts in 1899 were $2,952,098. Tamarack's copper was therefore marketed in 1899 for about 14.73c per pound, against 17.15c received by the Atlantic, Quincy and other mines.

News Bureau: At Houghton, the Calumet & Hecla has let a contract for 10,000,000 feet of timber yearly, covering a period of nine years. The excessive heat from the pipes of the steam pump for years past has rotted the timbering in the Calumet branch of the Calumet & Hecla mine. Miners are now driving a crosscut from the Red Jacket shaft to intersect No. 4 at level 51. Three months hence the Calumet branch entire will be unwatered from the Red Jacket shaft. A sump has been sunk at level No. 49, from whence water will be siphoned through the crosscut to the big shaft, thence hoisted to the surface in buckets.

MONTANA.

Montana's metal production for 1899 is figured as follows by the Anaconda Standard:

	Quantity.	Value.
Gold, fine ozs.	238,000	$ 4,919,896 64
Silver, fine ozs.	15,500,000 (Coinage)	20,040,404 04
Copper, fine lbs.	223,000,000	39,471,000 00
Lead, fine lbs.	22,000,000	979,000 00
Total value of production		$65,410,300 68

CASCADE COUNTY.

A. M. Esler has the Crocker, Bull's Head and Josephine groups, in the Swift Current mining district, in the ceded mineral strip of the reservation, and has contracted to develop them and concentrate 1,000,000 tons of ore. He is to pay the actual expenses of mining and is to receive $6 per ton for concentrating, expecting his profits from the payments for concentrating. He will build three concentrators of 200 tons capacity. The ore averages 8% copper and carries a little gold and silver. The nearest railroad station is Blackfoot, 45 miles away.

CHOTEAU COUNTY.

The Alabama mine, at Landusky, has twenty men at work, with milling ore on the dump ready for shipment and 100 tons of ore valued at $50 per ton. The ore will be shipped from Malta.

GRANITE COUNTY.

(Special Correspondence).—The Granite-Bi-Metallic mine was discovered by C. D. McLure, who, while an officer of the Hope M. Co., at Philipsburg, at the request of E. D. Holland, visited the ledge in the summer of 1880 for the purpose of making an examination of it. In doing so, he came across a small piece of float, which, upon careful inspection, had the effect of creating the impression in his mind that this big ledge had merit which lay far beneath the surface, and well did he become convinced of the value of his conclusions by subsequent visits, for he bonded the property in his own name for the sum of $40,000 and took immediate possession. Through him a syndicate was formed, of the following named prominent business men of St. Louis, many of whom are living yet, and heavily interested in the property, viz.: J. R. Lionberger, L. Duestrow, A. B. Ewing, O. B. Filley, S. Gaty, E. Harrison, J. L. January, L. M. Rumsey, M. Rumsey, A. F. Shapleigh, C. Taussig and C. Clark. This organization was effected in December, 1880, two months after Mr. McLure had secured possession of the property, and he became the first manager. At this date there was practically no development upon the property, and the expenditure thereafter made by the syndicate, and up to some

time in the summer of 1883, amounting in the aggregate to some $50,000, was carried along persistently upon intelligent lines, always with sufficient money at hand to accomplish the purposes desired, viz.: the development of the property and the great ledge. The total disbursement in mine purchase and development account at this time was approximately $100,000. J. R. Lionberger was the first president of the Granite Mountain M. Co., he being succeeded in December, 1884, by L. M. Rumsey, the latter continuously occupying the position up to the time of the consolidation in 1898.

The successor of Mr. McLure as superintendent of the property after its incorporation was F. L. Perkins, who, at the time of his acceptance of the position was also acting as superintendent of the Hope M. Co. of St. Louis, a corporation which, under the supervision of P. Deidesheimer, in 1866 built the first silver mill in Montana, at Philipsburg. Mr. Perkins remained in charge of the property until it developed into a bonanza. He was relieved in March, 1885, by J. W. Plummer. The company paid its first dividend, $60,000, in April, 1885. In 1884, Mr. McLure purchased the properties adjoining the property of the Granite Mountain M. Co. Co. on the west, and in July, 1886, incorporated the Bi-Metallic M. Co. C. Clark was the first president of the Bi-Metallic M. Co., and was succeeded by P. A. Fusz in October, 1889, who served as such up to the organization of the Consolidated Co. The members of the boards of directors in these companies being the largest stockholders in both, it was deemed advisable to consolidate them. On April 6, 1898, a charter was obtained under the name of the Granite-Bi-Metallic Consolidated M. Co., and on May 1, 1898, this last company took possession of the combined properties.

Beginning with the year 1883, and up to May 1, 1898, at which time the property was turned over to the Consolidated Co., bullion and ore were shipped as follows:

Granite Mountain M. Co., to the value of	$22,093,106 26
Bi-Metallic M. Co., to the value of	7,267,813 29
Total	$29,360,919 55

The net profits divided among the stockholders during that period amounted to $13,770,000.

The present officers of the company are: P. A. Fusz, Pres.; L. M. Rumsey, First Vice-Pres.; C. D. McLure, Second Vice-Pres.; A. B. Ewing, Treas.; M. Rumsey, Sec.; and W. Ziegler, Supt.

Philipsburg, April 20.

L. U. Loomis has bought the Great Western at Philipsburg and proposes to build a mill.

At Garnet, P. S. Mussigbrod and D. A. Bogart are operating the 10-stamp mill on ore from the Mitchell & Mussigbrod properties.

MADISON COUNTY.

M. W. Alderson is operating the Brother Jonathan mine near Moffat. The pay streak averages 8 inches, but the entire vein matter is treated, which gives an average of $12. The ore is run through a 5-stamp mill and crushed to forty-five mesh; 45% of the values is caught in the plates. The tailings are then treated by an agitating cyanide process.

SILVER BOW COUNTY.

The Standard notes at the upper Anaconda concentrator an improvement in the round tables used for dressing the concentrates. These tables revolve slowly with a steady motion, sloping downward from the center to the outer edge, so as to form a very flat cone. The tailings are run onto the table at the center. Extending from the lower edge of the table to the center, and partially encircling the central point, is a curved flume with two compartments which carries a stream of clear water. These compartments are so arranged that one is a little higher than the other.

The water first enters the upper one, passing through perforations into the lower one, from which it flows over onto the table. As the table revolves carrying its load of tailings, the latter are brought under the trickling stream of water from the flume. This washes the lighter slimes off into a sluice, which is under the edge of the table, whence they are washed away. The heavier concentrates are carried a little farther around, when they are struck by strong jets of water that wash them off into the saving sluice, leaving the table clean and ready to receive a fresh charge of tailings as soon as it gets around to the point of feed. These tables are about 18 feet in diameter. There are twelve of two stories and two single-story ones, making twenty-six table surfaces in all. The flume referred to is new. Formerly the water for dressing the concentrates and washing away the slimes was thrown onto the tables through iron pipes with perforations along their entire length.

The Boston & Montana M. Co. has bought from the original owners a half-interest in the Harris mining claim for $14,000.

NEVADA.

CHURCHILL COUNTY.

The rediscovery of the "lost" tin mine, 20 miles from Wadsworth, is attracting attention. From a sample sent to Swansea, Wales, returns have been received. The ore assays 17%. Five tons will be sent to Swansea to be worked.

ELKO COUNTY.

The Dexter mine at Tuscarora is sinking its shaft 200 feet deeper.

HUMBOLDT COUNTY.

The concentrating plant of the Glasgow & Western Exploration Co. at Golconda has been closed down. The sulphide ores from the lower levels of the mine are now going directly from the crushers to the furnaces. The change is expected to increase the extraction and reduce the cost of treatment.

NYE COUNTY.

At Belmont, Bell & Court have returns from ore shipped to Selby's. The ore worked 300 ounces silver, $43 gold and 25% lead. The returns gave satisfaction.

STOREY COUNTY.

The new Gould & Curry mill at Virginia City is intended to be the best modern crushing and concentrating plant in Nevada. The ore reserves in the Gould & Curry extend upward from the 425 level to the surface. They will be run into the mill in mine cars without sorting. Supt. Kinkead says he will have the mill ready to start as soon as the Floriston company delivers electric power on the lode.

The proceeds of $1869.99, payable to the Con. Cal. & Va. M. Co. for the first two carloads of ore shipped to the Selby Smelting & Lead Co.'s works at Vallejo Junction, out of the total amount of 300 tons to be sent for a test, are net proceeds in gold coin, with all charges deducted, including working charges of $6 per ton and freight at $4.80 per ton. The result shows that the Con. Cal. & Va. Co. has netted $38 per ton on the forty-nine tons contained in the first two carloads. The following items are from the memorandum of settlement:

Bulk weight of ore, 100,800 pounds; tare, moisture 2%, 2016 pounds; net weight, 98,784 pounds.

Contents of 98,784 pounds of ore—Silver $1319.66, gold $1088.60; total value of contents, $2408.26.

Assay per 2000 pounds, silver 47.07 ounces, gold 1.16 ounces.

Yield of the ore—Silver, 2342.88 ounces, less 5%, or 116.24 ounces, 2208.64 ounces at 59¾ cents per ounce, $1319.66; gold 57.295 ounces at $19 per ounce, $1088.60. Total yield $2408.26. Working charges at $6 per 2000 pounds, $296.35. Value of 98,784 pounds of ore (rate per ton $42.76), $2111.91. Freight at $4.80 per 2000 pounds, $241.92. Net proceeds payable to Con. Cal. & Va. M. Co. $1869.99.

NEW MEXICO.

A zinc mine at Organ, twelve miles from Las Cruces, is attracting attention. The mine was opened almost twenty years ago by prospectors looking for silver. Considerable silver ore was taken out, but it ran so much in zinc that it was abandoned. Assays show the ore to run 35% fine.

DONA ANA COUNTY.

When the wagon road is completed to the mines of the New Mexico Lead Co., in the San Andres mountains, the company will put in a 100-ton concentrator. They expect this plant will be in operation by July.

GRANT COUNTY.

The Pinos Altos G. M. Co. is daily taking seventy-five tons of ore out of the Gillet shaft. It is down 800 feet. The mine is lighted with electricity and the ore hoisted to the surface in a double-deck cage by a steam hoist.

The new leacher of the Santa Rita Co. is composed of eight large tanks. The process by which the ore is treated is expected to render profitable ore that runs 3% copper. The low-grade ore will be run through the concentrator and the tailings run through the leaching plant. Sulphuric acid is used to gather the copper from the crushed ore, and it is finally precipitated on iron.

The Colorado Fuel & Iron Co. is shipping from the Fierro district twelve carloads of iron ore per day to Pueblo, Colo. The ore runs about 60% iron, and it is thought there is enough gold in it to pay for transportation and handling, and it is all surface mining. The ore is taken out of the side of a hill, run in small cars to a crusher and from there dumped into the railroad cars.

OREGON.

BAKER COUNTY.

In the 400-level of the Columbia wire gold has been found. Mgr. Baillie will add ten more stamps. He is constructing a cyanide plant to treat the tailings. At present the percentage of values saved varies all the way from 60% to 85%, owing to the character of the ore.

GRANT COUNTY.

The Quebec group of claims, 6 miles from Granite, has been bonded by the Leiters of Chicago. J. C. Campbell is pushing work.

SOUTH DAKOTA.

CUSTER COUNTY.

H. Reinbold & Co. will quarry 500 tons spodumene rock at the Etta mine, near Keystone. They shipped several hundred tons to Europe last year, where it is used for the extraction of lithia. The advertising of this fact, however, led to the discovery of large bodies of other lithia-bearing mineral of better quality and nearer the markets, that it is no longer profitable for this purpose on account of the limited demand for these preparations. It is now used for fertilizing materials.

UTAH.

BEAVER COUNTY.

Lewis Martin goes to Frisco to take charge of operations of the Imperial M. Co. to develop thirty-one claims between the Horn Silver, the Massachusetts group and Cactus, which show ores that afford 12.3% copper, about twenty ounces silver and $4.20 in gold.

CARBON COUNTY.

On the 1st inst. at Scofield occurred a dreadful disaster. Mine No. 4, used as a powder magazine, exploded, with the result that 250 lives were lost—the entire number of miners at work in the mine when the explosion occurred. Miners from other districts came to aid in the search for bodies. The camp is about 100 miles south of Salt Lake City, on a branch of the Rio Grande Western Railway, which leaves the main line at Colton. The mines were operated by the Pleasant Valley Coal Co. of Salt Lake and employed about 700 men. It was the first day shift that was at work when the explosion took place. The cause of the explosion is not known, as no one survives to tell the story. No. 4 and No. 1 mines were connected. The men in No. 1 mine were suffocated; those in No. 4 were burned and mangled.

Up to noon on the 2nd 149 bodies had been brought out. Three hundred and ninety-eight men entered the mine for work on the morning of the 1st, and a great majority of these have perished. The relief force organized into two shifts and the one now in the mine has fifty bodies ready to bring out.

Many of the rescuers came near losing their lives from the fatal after damp, but the work was continued in the face of all danger.

One of the miners sent over from Castle Gate to aid in the rescue work said: "This explosion is the most disastrous, so far as loss of life is concerned, that has ever occurred in America. There will be 250 dead men when we are through work. In the great explosion at Almy, Wyo., a few years ago sixty-seven were killed. We had some hard experiences to-day going through the mine. Several times members of our party were overcome by the damp, but we got them out in time. We found the bodies of the men in every conceivable shape, but generally they were lying on their stomachs, with their arms about their faces. The men died almost instantly when struck by the damp and did not suffer. They just became unconscious and were asphyxiated. Their faces were all calm and peaceful, as though they had just fallen to sleep. The men in No. 1 might possibly have escaped had they started to run as soon as the explosion in No. 4, which is connected with it, occurred. Evidently they did not appreciate this fact until too late, as they put on their coats and arranged their tools before starting. They started, however, just in time to meet the damp half way. The bodies found near the entrance are badly crushed and bruised, as they got the full force of the explosion. They are few in number, however. Mine No. 1 is damaged comparatively little, but No. 4 is badly damaged."

A curious fact is that five men who were working outside of the mine were very severely hurt. One was blown with his horse a distance of 200 yards across the bottom of the canyon. The back of his skull was crushed.

The theory of Mine Supt. Parmeley is that some of the Finns recently imported secretly took giant powder down into the mine to assist them in their work. They were exceedingly anxious to make a good showing and as much money as possible, as it is thought that this form of explosive was used in order that great bodies of coal could be more easily dislodged. It is thought that when the giant powder was touched off it ignited some of the dust, of which every coal mine in the country has more or less.

Inquiry among the miners disclosed the fact that they entertained various opinions regarding the terrible affair, some being exceedingly bitter in their denunciation of the company, and others took a more conservative view of the matter and said it was one of those things over which no man has control, and for which no man or men should be held responsible.

JUAB COUNTY.

The Telluride Power & Transmission Co. will erect an electric plant at Tintic to furnish power for the mines of that district. A separate company will be organized to supply the town with light and contracts have been made with the Sioux-Ajax Tunnel Co. and the Lower Mammoth mine for supplying power.

SALT LAKE COUNTY.

In last week's issue mention was made of the suit of E. W. Genter vs. the Conglomerate M. Co. On the 25th ult. the jury returned a verdict for the plaintiff for $10,830.37, the full amount of his claim and interest. The suit was to recover $10,000 and interest for commission earned by the plaintiff in selling the Old Telegraph mine at Bingham. The Tribune says "the verdict is considered a further emphasizing of the principle that an agent, through whose efforts a sale has been consummated, is entitled to his remuneration, although the final negotiations may have been made direct between the parties."

At Bingham in the Shawmut, chalcopyrite, bornite and covellite have been taken from an ore breast at a depth of 130 feet in the main shaft that are expected to average 40% copper.

TOOELE COUNTY.

The projected consolidation of the Mercur and Golden Gate management is said to be "no go."

The Sacramento, at Mercur, will put in a new roasting plant.

The Sacramento, of Mercur, has sent to Salt Lake City 275 pounds of gold—the second during April. It has been decided to use the furnace now at the Golden Gate. It is said the management of the Golden Gate has succeeded in saving over 90% of the values in the ore.

UTAH COUNTY.

At Provo the Brooklyn Con. M. Co. has incorporated; capital stock, $100,000; Springville, headquarters. The company owns the Sunnyside and Brooklyn lodes at Tintic.

WASHINGTON.

KING COUNTY.

The receipts of the Seattle assay office in January were $139,316.77; February, $132,409; March, $100,359.86; April (three weeks), $33,659.16.

SNOHOMISH COUNTY.

M. J. Willard, foreman at the Carmack mine, Index, says a double shift of men is sinking and drilling. The ore is partly free-milling, decomposed quartz, carrying some silver and copper. A 10-stamp mill and two concentrators are talked of.

At Darrington the Park & Johnson M. Co. have bought the Forest mine for $15,000.

STEVENS COUNTY.

The Le Roi, B. C., is sending 3000 tons ore per month to the smelter at Northport. Notwithstanding this it will not start up till June 1. The ore will have to be roasted and the management desires to have a large surplus on hand.

The Silver Butte M. & S. Co. has organized at Northport, and has bought the Silver Butte and Silver Star claims for $100,000. They say they will put in machinery which will enable them to daily ship three carloads of ore to Great Falls, Montana. The previous owners recently shipped four carloads, which netted them $2500 on the cars a Northport. The ore runs 60% lead in addition to some silver values.

FOREIGN.

BRITISH COLUMBIA.

American miners are going into Atlin.

J. P. Graves, of the Granby smelter at Grand Forks, says it is practically completed; he has 100 acres of lime rock on the North Fork about two miles above the smelter, on the main line of the railroad; will use Crow's Nest coke; has a sawmill capacity of 26,000 feet daily; built the smelter for mines and expects to have all the ore they need at their own mines. If they need any additional ore for fluxing they will buy it. He wants specifications for a central compressor plant to operate the mills at Phœnix, which will have a capacity at sea level of fifty odd drills, or at the elevation of the mines, 4800 feet, of forty drills, to operate the Old Ironsides, Knob Hill, the Granby Smelting Co.'s group of four claims—the Victoria, Etna,

Phœnix and Fourth of July—and the four claims of the Grey Eagle Co.

The following is a list given by the Ymir Miner of the mines working within 10 miles of Ymir, with the number of men employed :

Mines.	No. of men.
Ymir	145
Roanoke	8
Wilcox	4
Rainy Day	6
Dundee	5
Big Horn	10
Union Jack	3
Arlington	42
Erie Con	5
Second Relief	35
Susquehanna	8
Tamarac	12
Blackcock	10
Good Hope	11
Dominion	3
Nevada	8
Elorado	3
Hillside	6
Yellowstone	40
Canadian King	40
Leo	6
Katie D. Green	8
Other claims	20
Total	438

The Cascade Power & Light Co. is developing 12,500 H. P. at the falls in the Kettle river at Cascade, twelve miles from Grand Forks. The dam is built near the head of the Cascade gorge, and is 400 feet long and 40 feet at the base. The flume will be 2700 feet long.

At a recent London meeting of the shareholders of the Hall mines it was decided to reorganize the company on the basis of a fresh assessment of 5s per share.

J. Russell, from Atlin, reports a strike on Spruce creek on claim 90, below discovery, of free-milling gold quartz 4 feet wide.

The London Con. G. F. E. & M. Co., owns the Silver Hill, Norfolk, Simcoe, Green Crown S. & N., and Roy fraction, on Canyon creek, a tributary of Crawford creek, 12 miles east of Pilot bay. The property has been developed by 3000 feet of tunnels, drifts and crosscuts. In one of the tunnels, 800 feet from its mouth, a shoot of gray copper ore has been found.

Some time ago Carl Kleinschmidt & Christie bought the Georgia group of copper mines, eight claims on Texada island, 50 miles north of Vancouver. The company owns a smelter there. The Georgia mines are producing about 100 tons a week, carrying 14% copper and $8 in gold. Kleinschmidt says he will build a smelter there. He is now in Butte, Montana.

Supt. Parker of the North Star says he is shipping to Great Falls, Mont., about seventy-five tons per day. The ore averages about $62 per ton. It is a silver-lead ore averaging 55% lead, and the balance of the values in silver. The mine is paying a profit. The values given are figured by the old method, where the duty of 1½ cent per pound on the lead was paid; but according to the new method in vogue, whereby no duty is paid, but where the price of lead is fixed by the London market, the values would be less. The wage scale was recently raised by the North Star, and is the same as in the Slocan. The Sullivan, 4 miles from the North Star, is being developed by the old Le Roi people. The St. Eugene mine is employing 250 men in the vicinity of Moyie. A 100-ton concentrator has been built.

The North Star, East Kootenay, is shipping to Great Falls, Mont., about seventy-five tons per day. The ore averages about $62 to the ton. It is a silver-lead ore, averaging 55% lead and the balance of the values in silver.

At Rossland the contract system is meeting with favor among the men. Good miners at work on the Columbia-Kootenay, Josie and No. 1 mines are applying for contracts in the Le Roi mine. Three drills on contract have started on the War Eagle mine. The ordinary day's wages, it is stated, were passed, and, if the present rate is kept up for thirty days of the contract, the takers calculate to make well over $120 apiece. Two shifts are working, the muckers removing the loosened rock during the continuance of the work, and blasting is done on the odd shift. There are about fifty men engaged.

COREA.

J. Sloat Fassett has returned from Corea, where he has a mining concession of 400 square miles. He says he can ship a ton of freight from New York to the mines near the Yaloo river as cheaply as the same ton can be sent to the mountains of Idaho, and about as quickly, too. His lease has twenty-five years to run. He has the right to mine any mineral, but has confined his attention to gold alone. All of his machinery is of American manufacture, as this country makes the best machinery for mining purposes in the world. He employs seventy-five white men and 3000 coolies. There are many good fields in Corea, as the country possesses a continuation of the gold-bearing outcrops of Siberia and Manchuria, both of which are bound to be great gold producers. The Coreans have been mining with crude methods for many centuries, and they are still at it.

MEXICO.

The Somara mine of El Oro, sold to the El Oro Mining & Railroad Co., Ltd., of London, is reported to have brought $2,500,000. The shaft is sunk about 700 feet. C. D. Lane is a holder of a block of the stock. P. L. Foster is Gen. Mgr.

RUSSIA.

The Berliner Tageblatt hears from St. Petersburg that the Englishmen who were authorized to prospect for gold near the eastern coast of Siberia, on the shores of the sea of Okhotsk, have discovered immensely rich strata, described as "a second Klondike." Col. Osborne is said to have gone to St. Petersburg to ask for a concession for exploiting the gold field. The Russian Government seems disinclined to grant any concession to foreigners.

SOUTH AFRICA.

Reuter reports that holes have been bored in a number of mines at Johannesburg preparatory to their destruction by dynamite. The mines in question include the Langlaagte Estate, the Robinson and the Paarl Central. Holes are also being rapidly bored in the deep level mines. The Boers are said to be determined to destroy the mines out of revenge in the event of their ultimate defeat. All British subjects and Americans and a large proportion of Germans are to be sent across the border.

THE KLONDIKE.

In February, '98, L. Patnaud resigned as postmaster of Everett, Wash., to go to the Klondike. Three of his friends made up $400 as a grubstake. No word came from him until he returned to Everett on the 10th ult., when he divided $10,000 among the three who had staked him.

Dawson reports a stampede up White river, which empties into the Yukon from the west, 12 miles above Stewart, which is deserted. Bedrock is from 8 to 12 feet, and the pay on discovery claim averages about 2 feet thick and of unbroken width. The gold is coarse and runs from 10 to 50 cents to the pan.

Sixty Yukon steamers between Bennett and St. Michael are being placed in readiness for the Yukon. The break-up of the Yukon above Dawson is expected about May 5th. It will find all navigation companies prepared for business, for both supplies and men have been pouring through Skaguay for a month.

Industrial Notes.

—On the 2nd inst. the House of Representatives passed the Nicaragua canal bill by a vote of 225 to 35.

—A railroad 220 miles long is to be built from Great Falls, Mont., where the Boston & Montana and other smelting plants are, to Billings, to connect with the C., B. & Q. Ry.

—San Francisco foundrymen are scouring eastern and northern Nevada for scrap iron, and machinery once costing hundreds of thousands of dollars is shipped as junk to be remelted.

—Machine shops and iron working tools are wanted by the Cohahuila & Zacatecas Railway of Saltillo, Mexico, which proposes to spend $500,000 in building machine shops with modern equipment.

—The American-Mexican Railway Co. has incorporated at Tucson, Arizona, to construct a road thence to Phœnix and from Tucson to St. George's bay, on the Gulf of California, 200 miles south.

—Vladivostok, Russia, will build twenty miles of electric trolley road, an electric light plant and water works. Consul Greener says there is opportunity for American contractors to secure some of the work.

Personal.

A. O'DONNEL has been appointed Supt. Conjecture mine, Hope, Idaho.

F. E. WILSON has been appointed Supt. Bunker Hill mine, Stockton, Utah.

SAMUEL ROBBINS of Eureka, Utah, is Supt. G. M. M. Co., Glendale, Mont.

J. H. HAMMOND is examining mining property in San Juan county, Colo.

W. H. WICKHAM has gone to Ely, Nev., to take charge of the Chainman mill.

HARRINGTON BLAUVELT is Supt. Cast mine, near the Hassayampa, Arizona.

THEO. F. VAN WAGENEN is examining dredging ground near Yuma, Arizona.

H. C. KINGSBURY succeeds Mgr. Garrigues at the Golden Zone, Loomis, Wash.

H. S. SANFORD is operating the Shorty Hope mine and mill at Ashland, Oregon.

SMILEY S. JONES is Supt. Empire M. Co. mill and mine, Groom creek, Arizona.

E. MCCORNICK, late of Wardner, Idaho, is now Supt. Vulcan C. M. & S. Co., Sodaville, Nev.

RICHARD A. PARKER of the U. S. M. Co., Utah, is examining California gold properties.

DANIEL DWYER, formerly Supt. Helvetia, Pima county, Arizona, has gone to San Marcial, Mexico.

CLARENCE E. KING has gone from Butte, Montana, to N. Y. City, preparatory to returning to the Klondike.

W. S. KEYES, Pres. Cal. State Mining Bureau, has returned to San Francisco from giving expert testimony at Butte, Montana.

GEO. B. ERNSHAW, Supt. Shawmut mine, Bingham, Utah, has gone to Tuscarora, Nev., to start up the new Young America mill.

H. W. FLETCHER AND S. H. HASSELMAN, formerly of the Iron Chief mine, Riverside county, Cal., left on the 1st inst. for Cape Nome.

CHAS. GRACEY AND A. W. VANDERCOOK of El Dorado Canyon, Nev., are in San Francisco to get a cyanide plant and other equipment for the mine there.

JAS. TAIT of Lincoln, Placer Co., Cal., will superintend erection of machinery in the Resurrection hydraulic mine, on Resurrection creek, Cook's Inlet, Alaska.

JNO. ANDREWS, long-time foreman at the Copper Queen, Arizona, will have charge for Ben and Lewis Williams at their new field of operations near Milton, Cal.

W. F. CODY, "Buffalo Bill," is now engineering a project to build a smelter in Wyoming, where twenty-five years ago he helped chase Sitting Bull and his band of hostile Indians.

A Good Recommendation.

MICHIGAN BLUFF P. O., CAL., Feb. 6th, 1900.

ERICSSON TELEPHONE CO., NEW YORK CITY—GENTLEMEN: We are in receipt of your letter of the 31st ult., asking if your telephones have given satisfactory service. Replying, will state we have in the last six months purchased of you four Ericsson wall telephones, with adjustable arm, and one Ericsson's Swedish desk set. These are in use on the local telephone line. They are giving excellent service, and we can confidently recommend them to those who require a telephone "that talks," either for short or long distance work. Their title of standard of the world is well earned. Yours very truly,

HIDDEN TREASURE GRAVEL M. CO.
By HAROLD T. POWER, Supt.

Since writing as above Mr. Power has sent another order. The Ericsson Telephone Co. have arranged with the Electrical Railway & Manufacturers' Supply Co., 548 Mission street, San Francisco, to handle their goods, and they will give prompt attention to all inquiries.

Catalogues Received.

GENERAL CATALOGUE GATES IRON WORKS, 650 Elston Ave., Chicago: While this concern issues several catalogues of specialties, it has concluded in this instance to furnish a compendium of illustrated description of mining machinery, and in this 238-page work supplies a more than ordinarily interesting and instructive mass of information concerning all classes of mining machinery, admirably arranged and profusely illustrated. With proper understanding of its value, the Gates Iron Works has copyrighted the entire contents. The book will be delivered upon request addressed to the Chicago house, or the California representative, the American Manufacturer's Association, 20–22 Fremont St., San Francisco.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING APRIL 24, 1900.

648,187.—HOSE COUPLING—J. E. Bright, Los Angeles, Cal.
648,242.—STERILIZER—J. A. Cronkhite, Los Angeles, Cal.
648,251.—FURNACE—J. Garden, Portland, Or.
648,072.—FEATHER RENOVATOR—A. C. Grube, Pasadena, Cal.
648,283.—GAS GENERATOR—H. P. Nielsen, Alameda, Cal.
648,303.—MUSIC BOX—E. C. Roberts, Phœnix, A. T.
647,992.—BOX MAKING MACHINE—Schanck & Hickman, Riverside, Cal.
648,117.—GLOBE—J. S. Stubblefield, Los Angeles, Cal.
648,004.—WINDOW SHADE CUTTER—W. T. Van Dercar, Pasadena, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MEANS FOR CHARGING LEACHING VATS.—No. 647,678; April 17, 1900. C. W. Merrill, Alameda, Cal. This invention relates to a method of charging ore or tailings to a leaching vat, which process is a step in the treatment of said ore or tailings preliminary to the application of the solvent soultion in cyanide, hyposulphite, or other hydrometallurgical processes. It consists of a tank or like inclosure, an inclined chute located above the inclosure and mechanism by which it is revolved about a vertical center, said chute having the bottom and vertical sides connected by concaved curved plates, openings made in the bottom of said chute at intervals between the upper and lower end transversely and longitudinally movable gates or valves whereby the positions of the openings may be varied longitudinally or from side to side and the area of discharge regulated.

DOOR CONTROLLER.—No. 647,671; April 17, 1900. M. A. De Lew, of Sacramento, Cal. One-half assigned to W. P. Coleman, of same place. This invention relates to a device which is especially designed to open or close doors of any description, either from points closely adjacent to the door or from a distance. It is especially adapted for the opening of heavy safe, vault, and other doors which are difficult to move, the opening of doors or gates upon railroad trains, steamboats or elevators, and in residences, and for opening and closing street doors from floors above or from points at a distance from the doors, and generally for controlling all means for ingress and egress of a like nature. It consists of a vertically hinged door, a shaft projecting from one end in line with the hinges and having a rocker arm fixed thereto, a cylinder fulcrumed at one end, a piston movable therein and a piston rod connecting with the rocker arm, ports or passages by which liquid under pressure is admitted to opposite ends of the cylinder, pipes connecting said ports with a valve chamber, a valve movable in said chamber having ports therethrough adapted to connect with the supply and discharge passages of the cylinder, a pipe by which liquid under pressure is admitted to one end of the valve chamber, a supplemental valve, controlling ports by which liquid is admitted to and exhausted from one end of the main valve chamber, electrically actuated solenoids and a lever connection between them and the supplemental valve stem whereby the latter is moved to admit liquid to the main valve, and a spring by which both valves are returned to their normal position when the electric circuit is cut off.

This Paper Fifty-Two Times, POST PAID, $3.00

Latest Market Reports.

SAN FRANCISCO, May 3, 1900.

SILVER—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 60c (1000 fine); San Francisco, 60c; Mexican dollars, 49c.

COPPER.—New York: Lake, 1 to 3 casks, 17.50 cash; carload lots, 17.25; Electrolytic, 1 to 3 casks, 17.25; carload lots, 17.00; Casting, 1 to 3 casks, 17.00; carload lots, 16.75. San Francisco: 17½@18. Mill copper plates, 21½c; bars, 23½@25c.

LEAD.—New York, $4.72½; St. Louis, $4.65; San Francisco 5c, carload lots, 5½c, 1000 to 4000 lbs.; pipe 7½, sheet 8¾, bar 7c. London, Soft Spanish Lead, £16 17s 6d =3.65c per lb.

SPELTER. — New York, $4.50; St. Louis, $4.60; San Francisco, ton lots, 6c; 100-lb lots, 6¾c.

ANTIMONY. — New York, 10c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 40@45c ℔ lb.

IRON. —Pittsburg, pig, No. 2, foundry, $22.50; gray forge, $21.50; San Francisco, bar, per lb., 3½c.

STEEL.—Billets, Pittsburg, $32; sheet bars, $36; San Francisco, bar, 12c to 20c per lb.

QUICKSILVER. — New York, $52.00; London, £9 10s; San Francisco, local, $51.50 ℔ flask of 76½ lbs. Export rates withdrawn.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

TUNGSTEN.—New York, ℔ lb., $1; San Francisco, $1.25.

FERRO-TUNGSTEN.—New York, 37c, 40c; San Francisco, 75c (60%).

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

SOLDER. — Half-and-half, 100-lb. lots, 21c; San Francisco, Plumbers', 100-lb. lots, 18c.

TIN.—New York, pig, $30; San Francisco, ton lots, 33c; 1000 lbs., 33½c; 500 lbs., 34c; less, 35c; bar tin, ℔ lb, 40c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

NICKEL.—New York, 45@50c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.70 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ℔ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 33@35c ℔ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 2¼c ℔ lb. 66° B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $7.00; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 3, 1900.

9:30 A. M. SESSION.

200 Belcher.....12c	200 Silver Hill...16c
300 B. & B.....18c	100 .....17c
100 C. C. & V.$1 55	600 Union Con...22c
600 G. & C.....20c	300 Utah.....10c
50 Sierra Nev..38c	

2:30 P. M. SESSION.

200 Ophir 54c	150 Savage.....06c
400 G. & C.....20c	400 Sierra Nev...37c
300 B. & B.....18c	100 Caledonia..$1 40
400 C. C.& V..$1 60	

Recently Declared Mining Dividends.

Rocky Gulch M. Co., Grant's Pass, Or., $2.50 per share	May 1
Amanda G. M. & M. Co., Cripple Creek, Colo., 1 cent per share	May 20
Southern Boy G. M. Co., Colorado, 1 cent per share, $10,000	May 1
Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	May 4
Rescue M. & M. Co., Utah, 34 cents per share	May 1
Standard Con. M. Co., California, 10 cents per share	May 10
British Broken Hill Proprietary, Australia, 1s 6d per share and 1s per share, interim, for current year	May 7
Champion Reef G. M. Co., India, interim, 4s per share	May 1
Sierra Buttes Gold Plumas-Eureka shares, California, 2s 6d out of reserve fund	April 27
wansea, Utah, $5000	May 10

Commercial Paragraphs.

THE Lunkenheimer Co. of Cincinnati, Ohio, has an order from the Russian Government for 900 special bronze valves, of sizes varying from ¾ to 3 inches, for industrial plants operated by the Government.

THE Jeanesville Iron Works Co., Jeanesville, Pa., and Denver, Colo., is building an electric station pump for the D. L. & W. Co., capacity 800 gallons per minute, 750-foot lift, said to be the largest electric pump ever built for so high a lift.

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: **EDWARD N. BREITUNG,**
MARQUETTE, MICH.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

LOCOMOTIVE WANTED FOR CASH.

One 36-in. Gage, Saddle Tank preferred.

Cylinder about 9-in. diameter by 14-in. stroke, or larger.

Also, ONE STEAM SHOVEL.

Would consider purchasing Little Giant Traction.

In replying, send full specifications, including age, present condition, location and lowest cash price. Address CONTRACTOR, 1603 Monadnock Block, Chicago.

Atlin Gold Fields,
British Columbia.

Of particular interest to HYDRAULIC OPERATORS and experienced QUARTZ PROSPECTORS.

American miners can pre-empt claims.

For further particulars write

BROWNLEE & LOWRY,

Civil and Hydraulic Engineers and Land Surveyors,

Atlin, British Columbia.

SITUATIONS WANTED.

ASSAYER, ANALYTICAL CHEMIST AND SURVEYOR,
with considerable experience in silver-plating mill plates, desires position. Best of reference furnished. Address A. B. C., this office.

WANTED, POSITION AS SUPERINTENDENT.
Thorough mining and mill man, assayer, accountant and business man. Twenty-five years' experience. References. Address T., this office.

FOR SALE.

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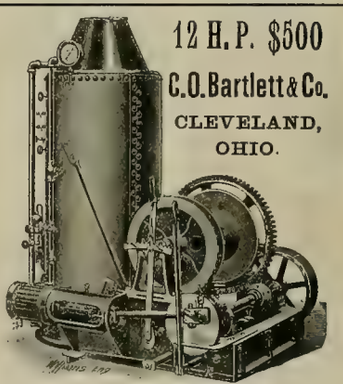
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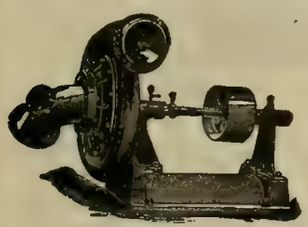
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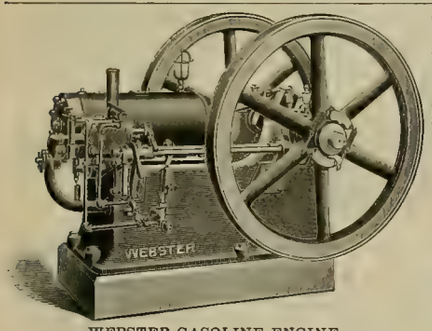
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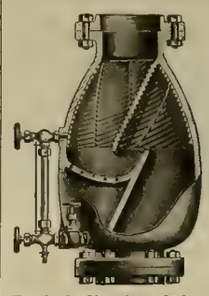
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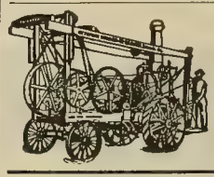
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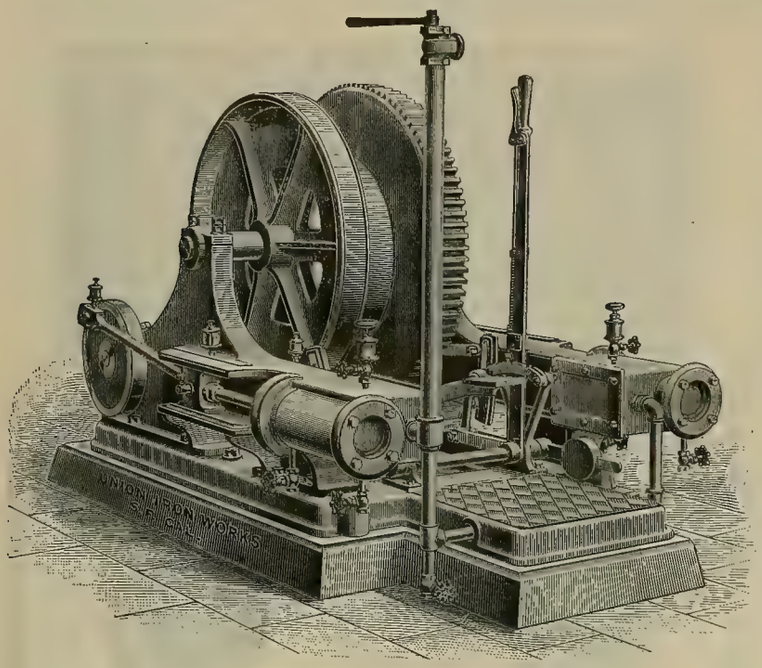
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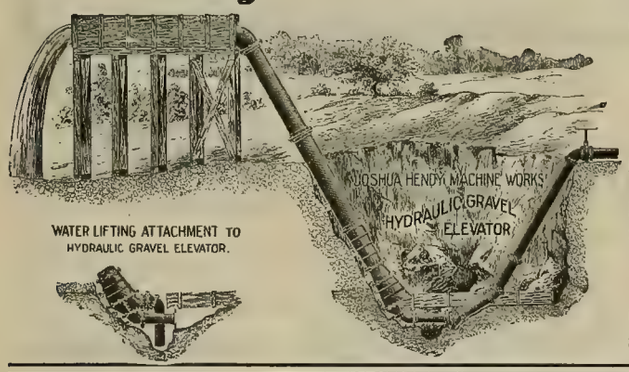
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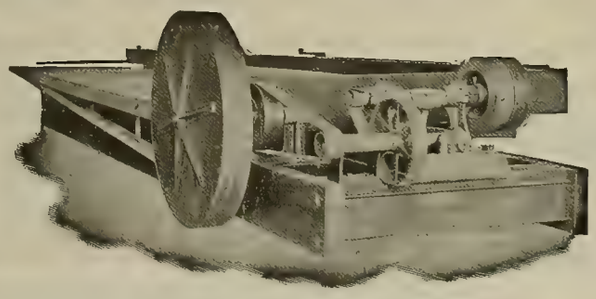
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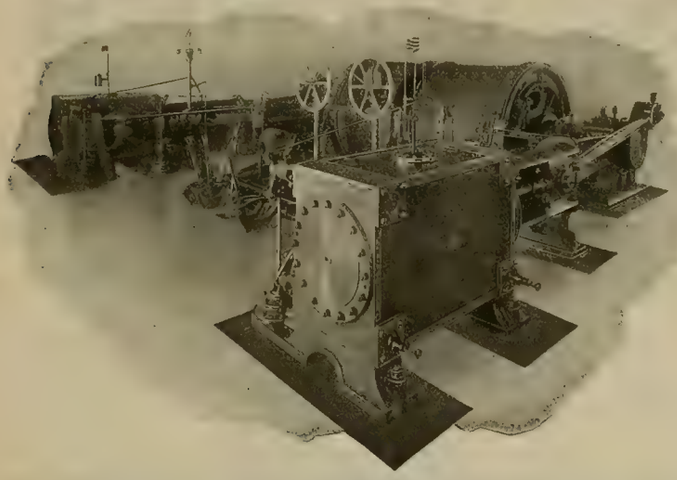
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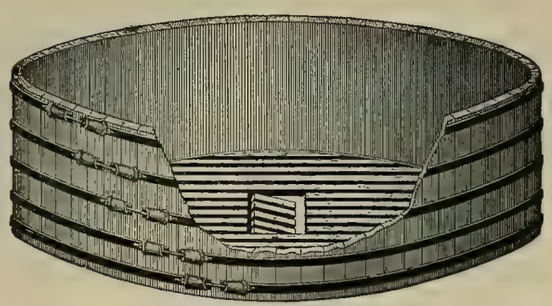
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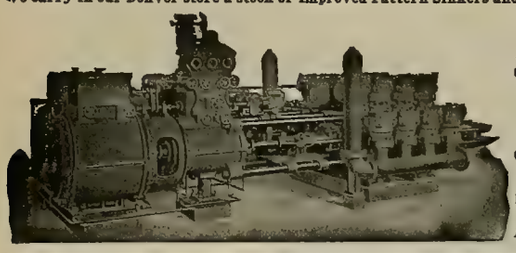
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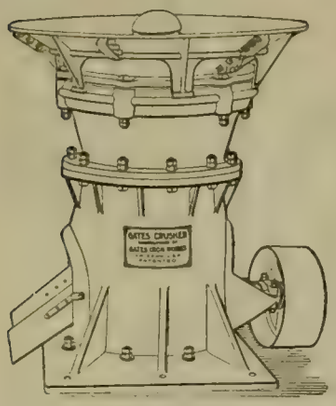
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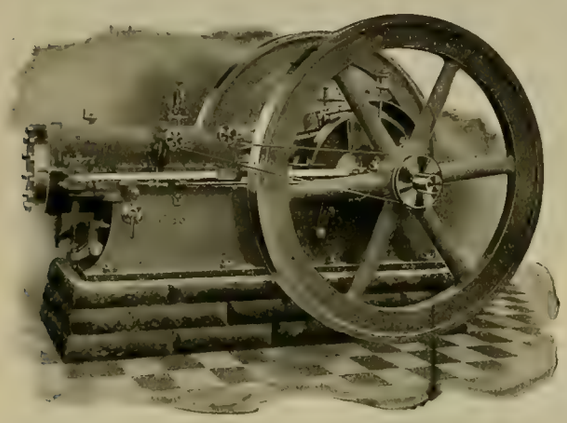
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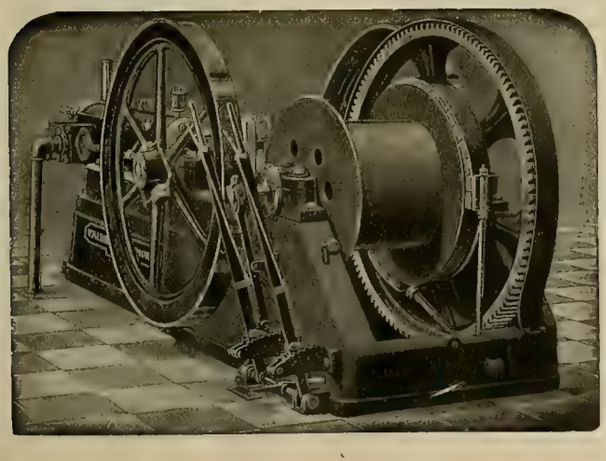
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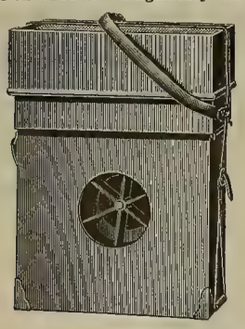
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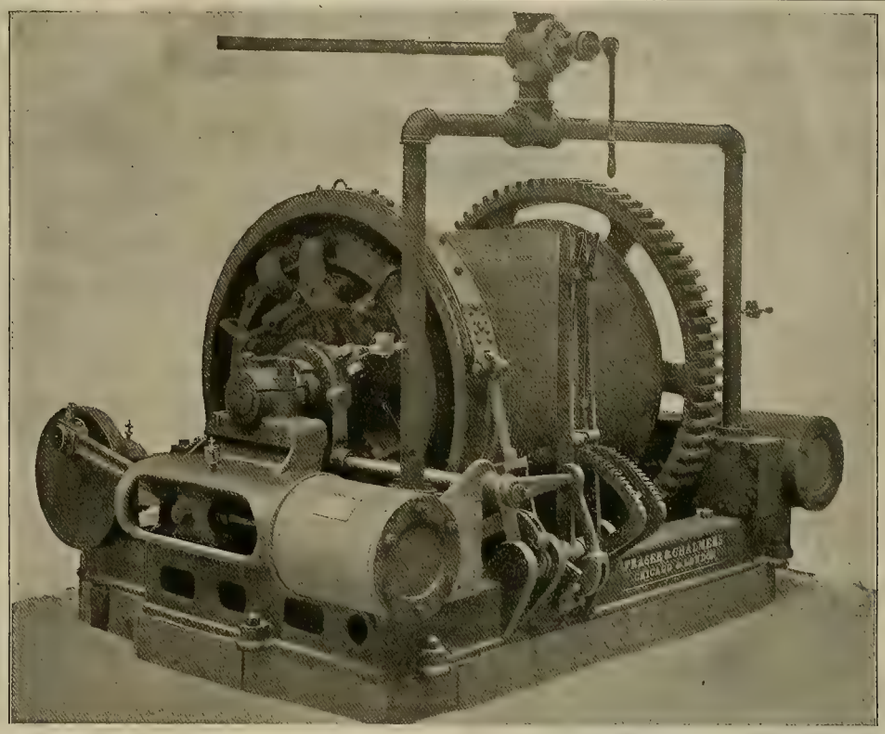
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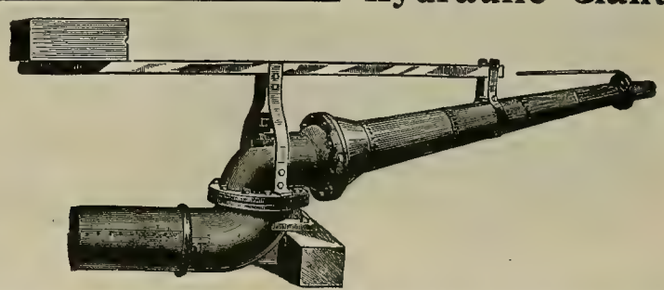
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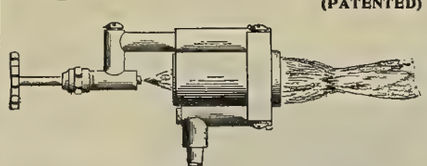
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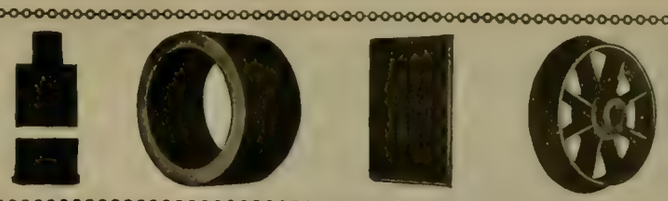
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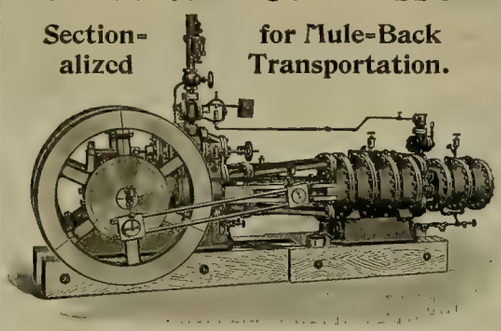
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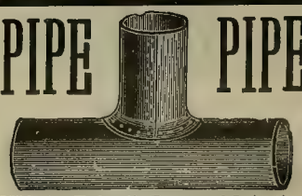
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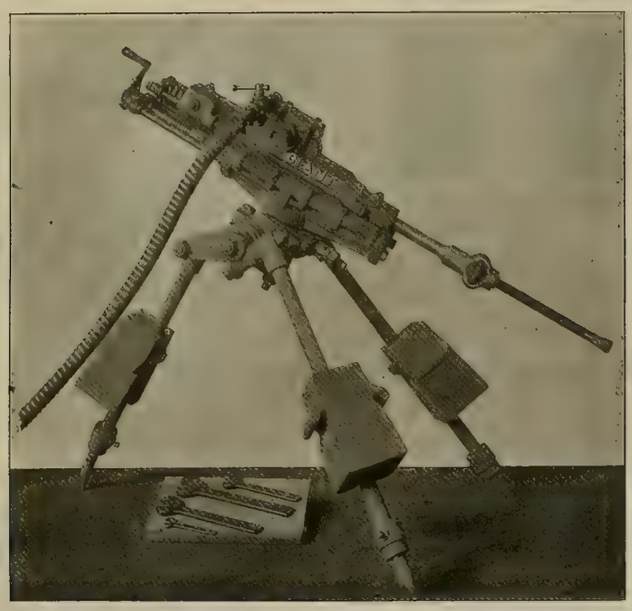
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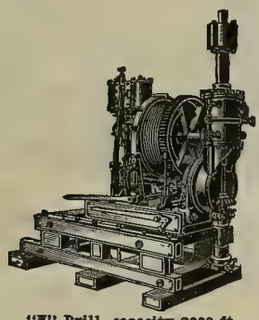
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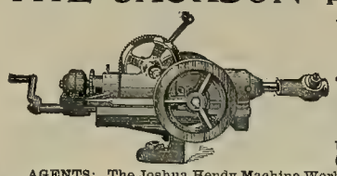
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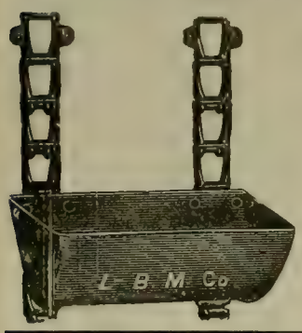
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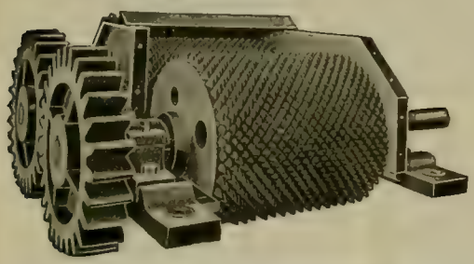
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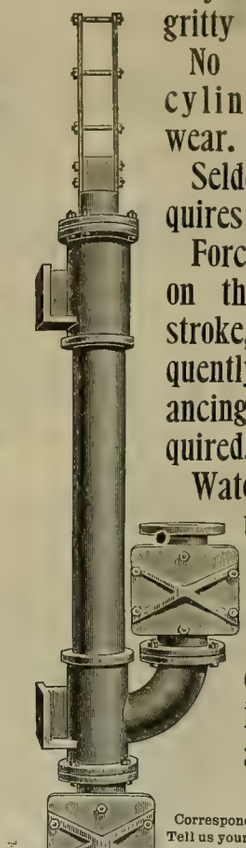
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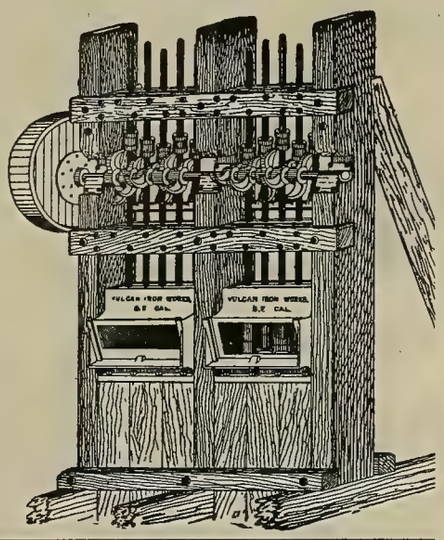
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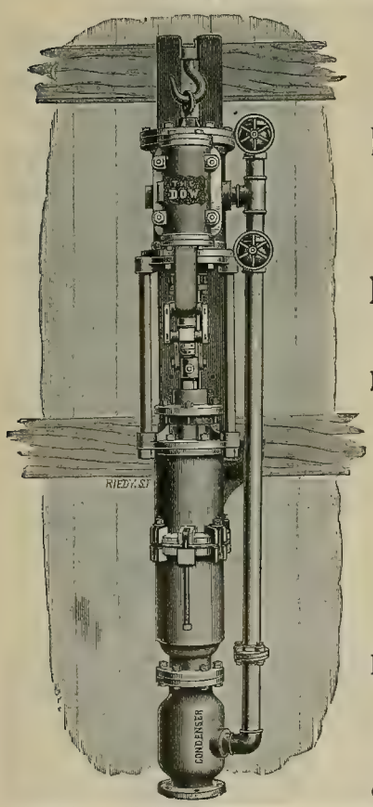
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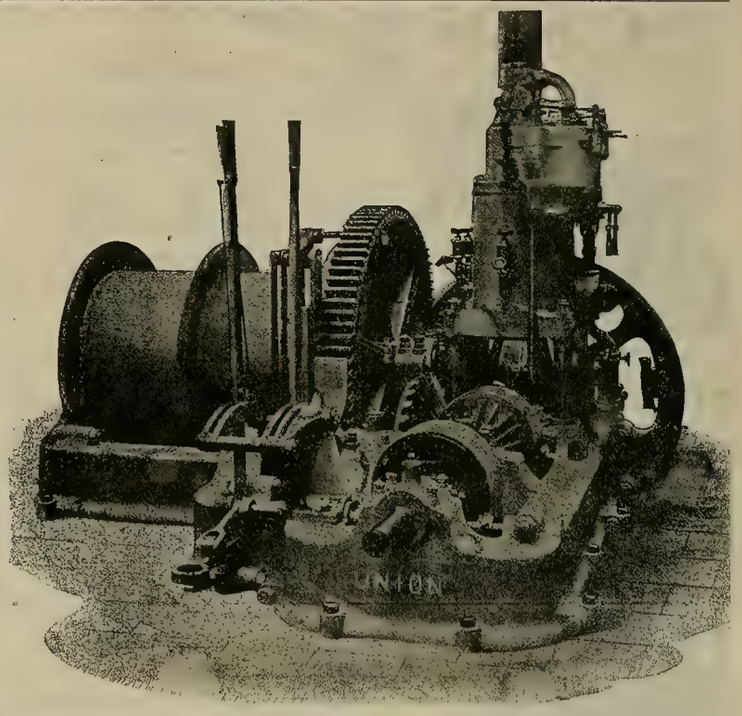
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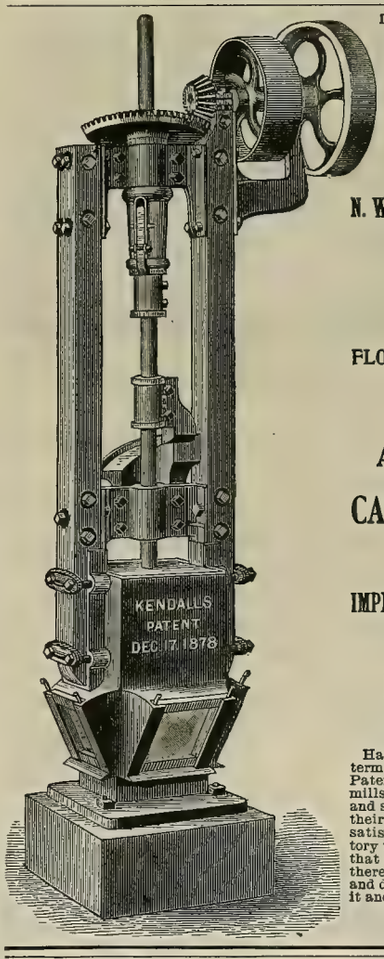
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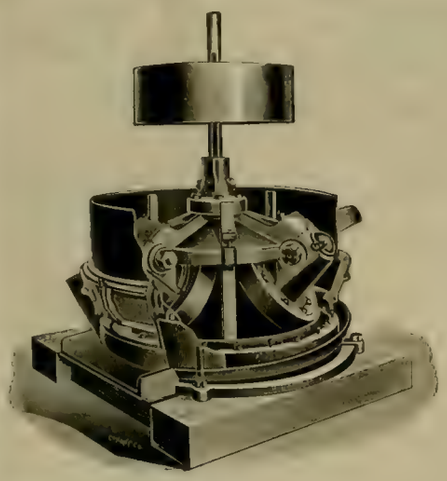
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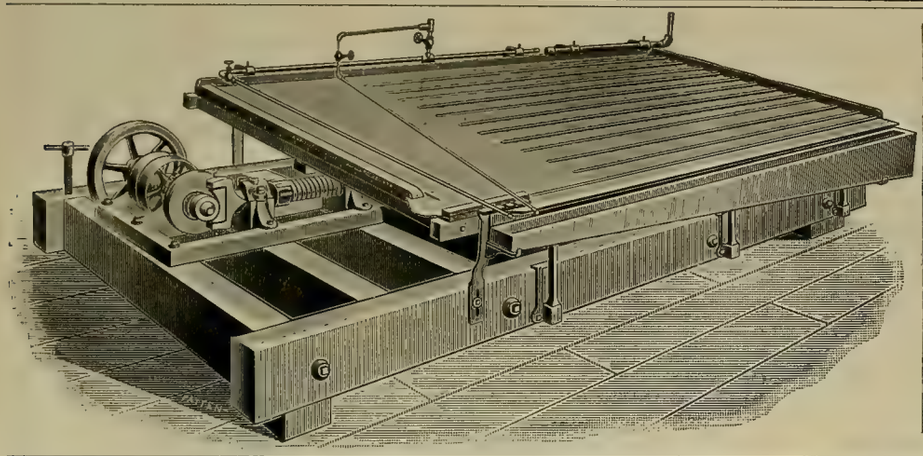


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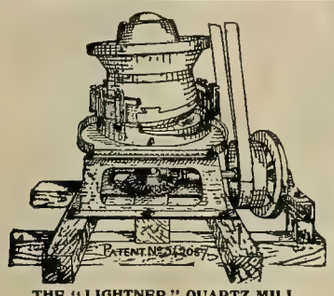
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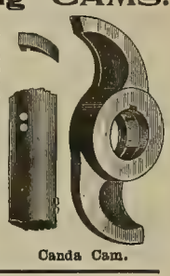
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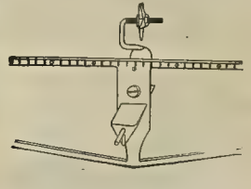
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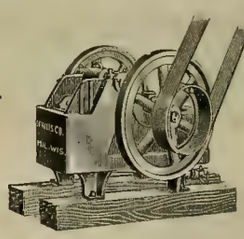
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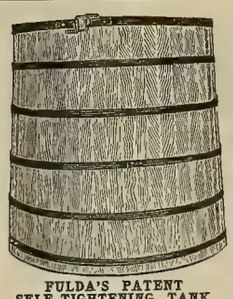
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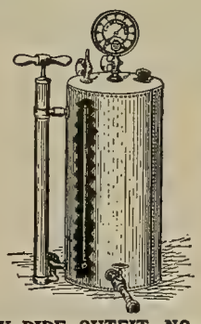
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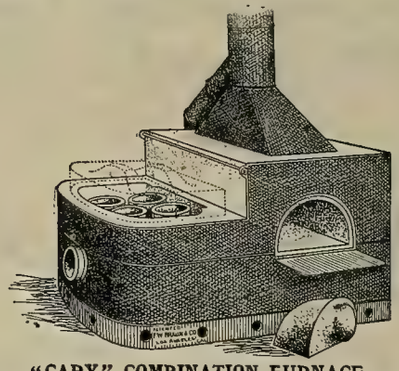
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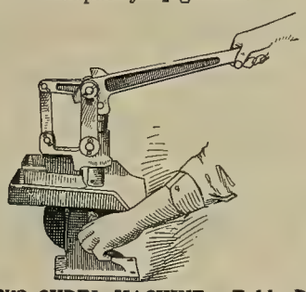
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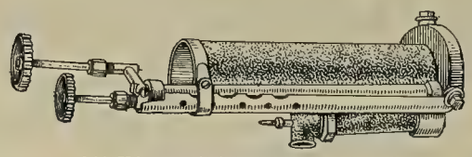
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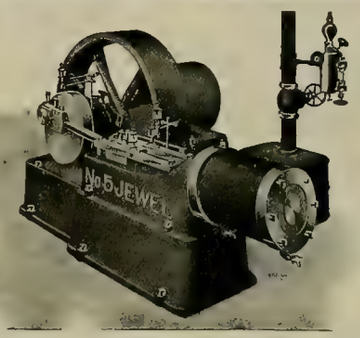
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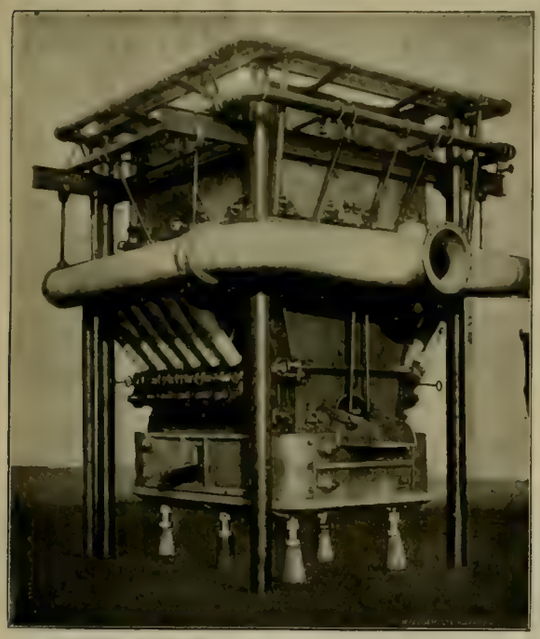
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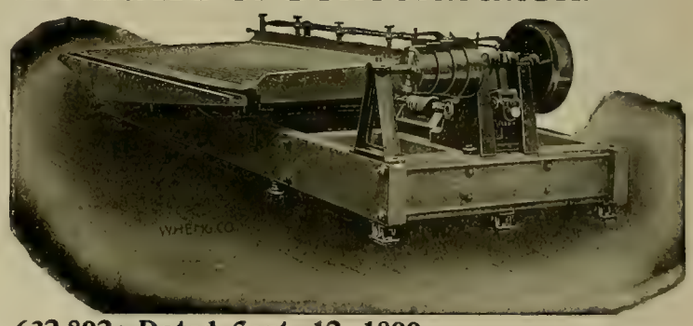
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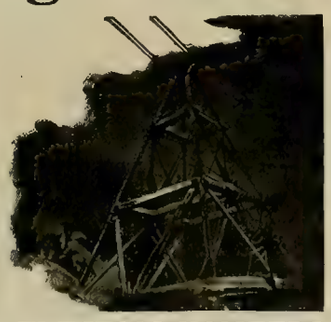
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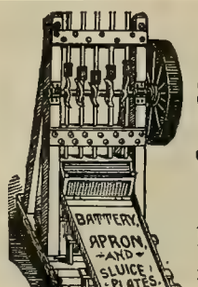
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Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of April, 1900, an assessment (No. 28) of 2 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of May, 1900, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 28th day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOYONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of April, 1900, an assessment (No. 70) of fifteen (15c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 31st day of May, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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Office—Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of April, 1900, an assessment (No. 16) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of June, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

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Office—320 Sansome street, room 24, San Francisco, California.

MAY DAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of April, 1900, an assessment (No. 4) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of June, 1900, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 25th day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HELD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

ANNUAL MEETING OF STOCKHOLDERS.

In accordance with the by-laws of that company, the Regular Annual Meeting of the Stockholders of the Jamison Mining Company will be held at the office of the company, Room 54, 120 Sutter St., San Francisco, California, on Monday, the 21st day of May, 1900, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. Transfer books will close on Saturday, the 19th day of May, 1900, at 12 o'clock M. and open again at 10 o'clock A. M. on Tuesday, the 22nd day of May, 1900.

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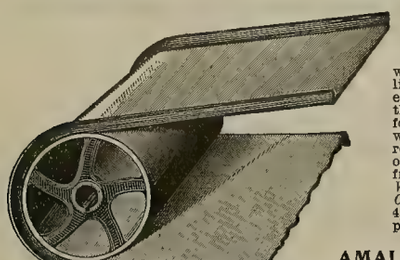
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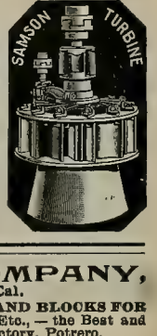
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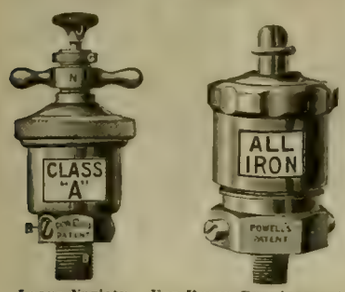


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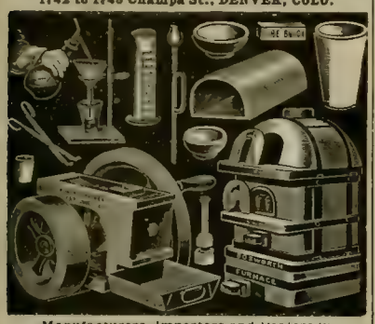


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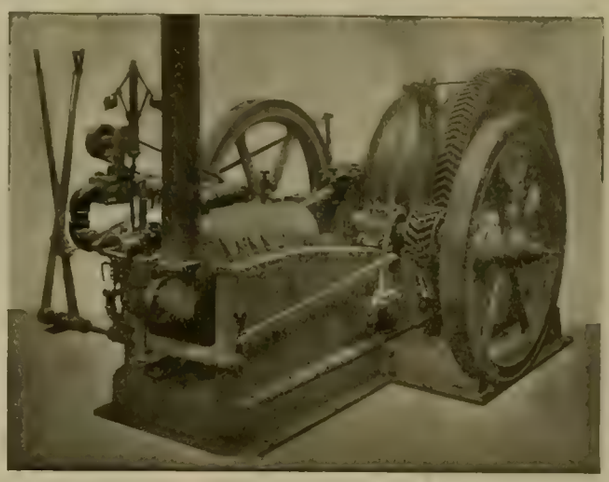
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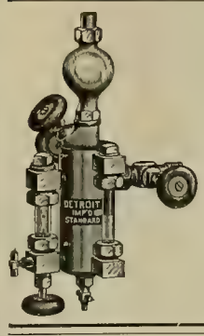
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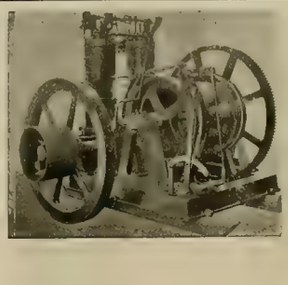
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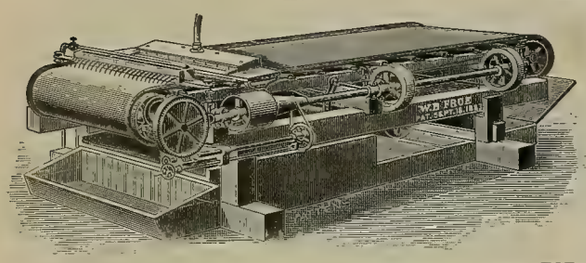
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The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

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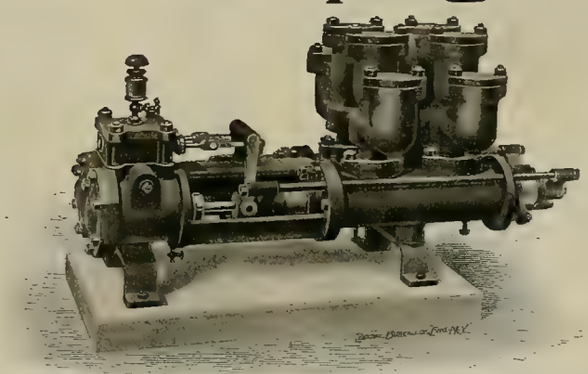
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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2077.—VOLUME LXXX. Number 19. SAN FRANCISCO, SATURDAY, MAY 12, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

This Paper not to be taken from the Library.

Removal of Rocks in San Francisco Harbor.

In the Bay of San Francisco, Cal., almost in front of Golden Gate and near Alcatraz Island, were three rocks which have been a source of danger and a constant menace to navigation in foggy weather, especially, on account of the strong tides and swift currents in that vicinity. On Sept. 14th, 1899, a contract was made by the U. S. Government with Rudolf Axman of Los Angeles, Cal., for the removal of these obstructions, for $253,000. For this amount the contractors agreed to remove Arch rock, containing 25,152 cubic yards; Shag rock No. 2 (entirely submerged), containing 2979 cubic yards, and Shag rock No. 1, containing 3800 cubic yards, all of which were almost wholly under water (see accompanying engravings). The specifications called for the removal of 1000 yards per month, and to a grade plane 30 feet below the mean of the lower low waters. The work is in charge of Lieut.-Colonel Heuer, Corps of Engineers, U. S. A., with H. L. Demeritt in local charge.

Shag rock No. 1, upon which operations were begun, was 25 feet in diameter at low water mark, and 10 feet in elevation. At the 30-foot contour it was oval in shape, the extreme length being 145 feet and the width 110 feet. It was composed of metamorphic sandstone, stratified, hard and soft. Work was supposed to begin on Dec. 1st, 1899, and drilling was commenced Feb. 1st, 1900, with 3¾-inch bits. Ten holes of that diameter were started, but, except one, could not be maintained on account of choking. On March 1st drilling was started with 10-inch bits, and after March 9th was carried on almost continuously until completion on April 24th. Twenty-four 10-inch holes, at an average distance of 15 feet apart, were bored into the rock from 9 to 38½ feet deep, making a total depth of 518.6 feet. These holes extended from 3½ to 7 feet, or a total of 120.4 feet below grade, and were cased downwards from 5 to 10 feet with double well casing.

Three percussion steam and one drop drill were tried with I, S and SS bits, but the drop drill and S and SS bits were abandoned. A depth of from 2 to 10½ feet was drilled per day of eight hours. Steam to operate the drills was conveyed, from a boiler on board a scow moored alongside, through a 3-inch pipe furnished with self-adjustable ball and socket joints. The holes were kept clear by use of duplex pumps with 1½-inch jets.

A swinging table, or platform, was built, from

(Continued on page 521.)



Scow, Steam Pipe Connection and Drills.



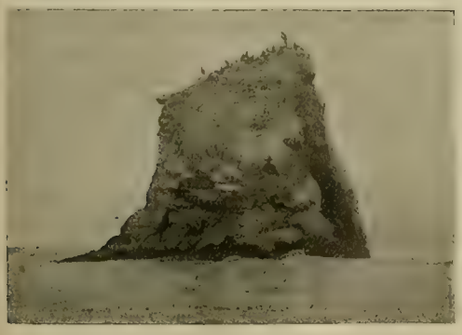
Method of Revolving Table Around Mast.



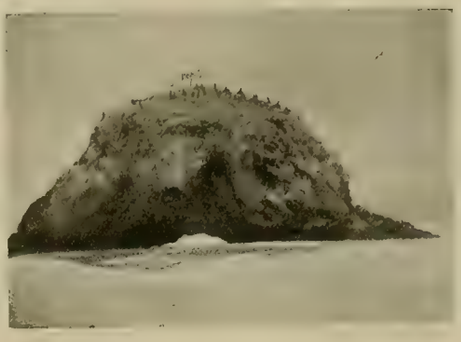
Table and Casings and Swift Currents.



General View of Table and Mast.



East End of Arch Rock, San Francisco Bay.



South Side of Arch Rock, San Francisco Bay.



North Side of Shag Rock, San Francisco Bay.

MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....Publisher.

San Francisco, May 12, 1900.

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WHAT brings money is a knowledge of how to do things and the ability to do them. It makes little difference how this knowledge or ability is acquired. It is, however, often easier and quicker to get some of it in technical schools than entirely through manual training. Probably the best place to learn the "how" is in the technical school, and the best place to get the ability and practical judgment is in the mine.

IT was supposed that all the "cyanide patent" litigation had ceased, but a case is now on trial where J. R. DeLamar is suing the DeLamar Mines Co., Ltd., of Idaho, for alleged infringement of patent. Plaintiff asserts defendant has illegally used what is known as the "Waldstein Process," which employs zinc dust instead of zinc shavings in the precipitation of the gold solution, and claims $300,000. Defendant asserts that such use of zinc dust was not new, nor a "discovery," as considered by the patent office. The fact, however, that the U. S. Patent Office issued a patent therefor will be a hard one to get around.

THE official figures of California's '99 gold yield by counties, published on the 21st ult., give a noticeably low percentage of silver. The figures were $15,336,031 gold and $504,012 silver. According to that, there is but 3% silver in California gold, though it is to be assumed that, as elsewhere, the proportion of silver is 10%. Taking this figure would give $1,584,000 silver, instead of $504,012—a discrepancy of about $1,000,000. It is probable that Statistician Yale's figures are correct as to his official returns, and that the difference lies in a million dollars in silver lost. These figures would indicate that, in California, not more than 33⅓% of the silver contained in the ores is saved—an uncomplimentary conclusion.

EVERY PAPER received at this office has the names of miners going to Cape Nome. The coast cities are alive with men thronging to the newest El Dorado. A few have arrangements that justify hopes of success; other few control capital to go into extensive enterprises, but the majority are mostly "taking chances," and are buoyed by hope that they may be among the lucky ones. 'Tis a dreadful lottery, in which the blanks mean disappointment, and, often, death, and it is a pity that so much energy and treasure should be flung away when one-tenth of it would develop better results in a better country. The hegira shows two facts: that those going do not believe this assertion, and the perpetual charm of novelty. The chief attraction to that region is that it is "a new country," and fancy fills the rest. One fortunate thing is that it will be easier to get back than it was from the Klondike three years ago, and the consequent aggregate of suffering and loss will be less.

A General Land Office Ruling.

Decisions from the Secretary of the Interior and rulings from the General Land Office of importance to miners are frequent, and their continued notice is necessary to those who would keep informed. The latest reverses all previous rulings of the Land Office since '84, and is of particular interest to the holders of unpatented mining ground. Summarized, the case is as follows:

In Cripple Creek district, Colorado, on Carbonate hill, the Carbonate Hill Company owned and patented the Hustler and New Year claims adjoining. The westerly end center of the Hustler claim was located within other ground owned and patented by the Fort Wilcox Co. By "end center" is meant the central point on the end line of a claim located 150 feet from either corner stake. The Washington authorities rule that the end center may be located either within ground already patented or not patented, as it may happen to be.

The westerly end line of the Hustler joined the side line of the New Year, and if a new survey was to be made the old locators of the Hustler would have to go up the hill 600 feet farther in order to establish an end line, the center of which should be clear of the Ft. Wilcox ground. The Carbonate Hill Company had done $1000 worth of development work for the two claims and $800 of it was performed on the New Year. If the Hustler claim had to be relocated at a point 600 feet distant from the New Year, then the extra patent work done on the New Year would be wasted and the Hustler would have to be patented all over again, as the two claims were no longer "contiguous."

The receivers' receipts for the Hustler and New Year were cancelled in so far as they applied to the Hustler and allowed to stand for the New Year, being one of the few instances where receivers' receipts have been cancelled by the Government. The Carbonate Hill Company took the contest to the General Land Office, claiming that they had a right to patent under the original survey, also that the New Year and Hustler were located contiguous and the patent work done on the New Year was for the benefit of both claims, and that the fact that the end center of the Hustler fell within the territory located and patented by the Ft. Wilcox counted nothing against the Hustler location. The Carbonate Hill Company based its contention for the latter point upon a decision of the United States Supreme Court in the famous case of the Del Monte and Last Chance lodes, claiming that it was a directly parallel case. In this latter case the end center of the claim was being patented within territory that had already been patented to another company, but this did not make it necessary for a re-survey and location. The General Land Office rules in favor of the Hustler, and thereby allows the end line located within the Ft. Wilcox to stand; the patent work done on the New Year, which is still contiguous territory, will apply on the Hustler and no new location is needed. The decision gives the Carbonate Hill Company a chance on all apex questions which may arise in the future on all veins which are found to pass through both end lines of the Hustler.

MUCH stress is laid in an Eastern journal on the probability of unusual profits in Japanese and Corean mining investments because of the "cheap labor" procurable. Without discussing the likelihood of profit in working those mines—a matter that depends wholly upon the value of the ore or ground—it is to be noted that, among a certain class of minds, there still lingers a lurking belief in the efficacy of "cheap labor" as an economic factor. Those people forget or ignore that in all cases the quality of the labor is to be taken into consideration as well as the rate. "Cheap" labor is often the dearest kind to its purchaser. "Cheapness" is a relative term. As in buying advertising space, so in buying labor; it is not what you pay, but what you get for what you pay that determines the value. In this matter of labor for mining purposes it is almost an axiom that labor low in price is also low in efficiency. It is the experience of men who have carried on great mining and engineering enterprises in different parts of the world that, after all, the nominal rate of wages made little difference, for the cost of what may be styled a unit of work is pretty nearly the same everywhere. With this view, the Eastern idea is untenable—that because one can hire a Japanese or a Corean for 25 cents per day, therefore the mining work must result all the more profitably.

THE cyanide process is well suited to a limited class of ores, is fairly successful in many cases where other processes produce a less economical result, but can not be considered as a universal solvent. In such cases as the Mercur mine, in Utah, it is invaluable, as the ores of that mine would be comparatively valueless by any other treatment. In a modified way, the same may be said of the Witwatersrand, South Africa. The cyanide process is best suited to siliceous and limestone ores, in which the gold is finely divided. It will make a fair extraction from pyritic ores in which oxidation has not begun. It is suited to old tailings weathered and leached by rains, and to new tailings where the leaching is made too slow by slimes. Whatever difficulties may arise in the lines mentioned will probably prove to be mechanical ones. It is not well suited to ores carrying coarse gold, as the time required for solution is too long; nor is it wholly successful with ores carrying copper. For nearly ten years there has been a constant advance in practical knowledge of the cyanide process, the experiments and successes having been chronicled in these columns by those who have most largely contributed to its development.

THE dreadful disaster at the Pleasant Valley coal mine, Scofield, Utah is still the theme of current comment. Utah's State Mine Inspector, Gomer Thomas, says: "The accident was caused by the neglect of the Pleasant Valley Coal Co. I do not want to call it criminal negligence, because it does not amount to that. But there has been considerable carelessness. The dust in tunnel No. 4 and in the various cross-entries and 'rooms' should have been sprinkled with water. Had that been done, none could have arisen to be ignited. The coal in No. 4 has a larger percentage of fixed carbon than in No. 1, and was, I think more liable to be ignited. Consequently there should have been greater precaution taken than in the old property." From every quarter is sent prompt and substantial sympathy. David Keith wired $1000 from San Francisco; so, likewise, did Dr. Bell of Colorado Springs, Colo.; C. S. Battermann, chief engineer Boston & Montana mine, Butte, Montana, also wired $1000 on behalf of the employes in aid of the suffering families. From every part of the mining country come such contributions in lesser individual extent, but aggregating considerably over $100,000. The total number who perished is stated to be 200.

WITH party politics of course this paper has nothing to do, but in connection with that higher politics—the science of government and interest in public affairs—is to be noticed the influence that the mining industry and its products exert in the politics of the past few years. Nothing in the last presidential election was so prominent as the question of the cost of production of the precious metals and in general the methods of mining. And all this gave new impetus to the business and lent new interest to that most ancient of all the world's trades and arts. To nothing more than to such widespread public interest does mining owe its present prominence. While the old-time romance and mystery of mining long since departed, the inquiry and knowledge have led many to see that mining was like any other business, with the same risks, the same successes, the same possibilities of profit when rightly managed, and that skill and caution, ability and judgment reaped such reward in the field of mining as they do in any other legitimate industry.

ON page 522 appears a full detailed official statement of the mineral product of California for 1899. The report is so elaborate as to render editorial discussion unnecessary, as the statistics speak for themselves. Most noticeable is the oil output, which has increased from 1,240,223 barrels in 1895 to 2,667,875 barrels in 1899, California now ranking fourth among the States of the Union in petroleum production, with a value of output in '99 aggregating $2,660,793. The industrial importance of this can not be overestimated, for the absence of cheap fuel has heavily handicapped California's manufacturing industries.

Concentrates.

POWDER should never be thawed by dry heat.

SEVERAL LOCATIONS may be embraced in one advertised application for patent.

THE election of a non-stockholder as a director of a California corporation is illegal.

IN Arizona newly constructed railroads are exempt from taxation till Jan. 1st, 1902.

GOLD DREDGING MACHINES are now operated by steam, electricity and gas engine.

THE Kennedy mine, Amador county, Cal., is probably the deepest purely gold mine in the United States.

IN Russia the private gold miner is compelled to send all the gold he extracts to the nearest government smelter.

THE Gwin mine, Calaveras county, Cal., secured a U. S. patent in 1897. The cost there of mining and milling is less than $2 per ton.

CARBOLIC ACID has been recommended for use in tempering steel tools, but with what practical success "Concentrates" is unable to say.

IN a stream current of 1½ miles per hour of the water next the bed gravel stones 1 inch diameter will be moved; a 3-mile current will scour the channel.

ON April 21st the population of Dawson, Y. T., was 5404; of Klondike, 3397. Dawson miners think little of Cape Nome, but there is an exodus to the Koyukuk.

ANY ONE wanting to know anything about mica can address A. O. Schoonmaker, 158 William St., New York City, with probability of success in securing the desired information.

PURE tungsten may be made by first forming the chloride of the metal, then oxidizing this, and reducing the oxide by means of an electric arc, pure metallic tungsten resulting.

A HOLE 12 inches by 12¾ inches through a 1½-inch plank, 6-inch head above top of opening, will each minute discharge 200 miners' inches, each miners' inch equaling 1.4994 cubic feet.

FIGURING from 1860, it is calculated that about 25% of the debris in California river beds is due to the hydraulic miners, about 75% to natural erosion and the general result of settlement and agricultural progress.

UNDOUBTEDLY there is gold in the ocean, "millions of tons of it," but to extract it at a profit is as yet an unsolved problem. It is not "impossible"—nothing is "impossible," absolutely; but it has not yet been done.

AT one time in its history the El Callao mine, Venezuela, S. A., had upon it nearly thirty companies, working 758 stamps, but it is now about worked out. The ore was very rich, but the cost considerable, averaging $14 per ton.

SAN FRANCISCO could probably put dynamite afloat in South African ports for 17 cents per pound, but till the close of the South African war and the consequent end of the powder monopoly in the Transvaal nothing will be attempted.

THE Rio Tinto copper mines, Spain, were worked by the Romans nearly 2000 years ago. The present workings are in an enormous bed of pyrites, carrying about 3% copper. There are uncovered reserves of (estimated) 15,000,000 tons ore.

POSSIBILITY of error in hand sampling is so great as to recommend the use of automatic ore samplers to insure uniformity and accuracy. There are several, and any mining machinery manufacturer can supply one that would give satisfaction.

THE latest in metallurgy is the process now being patented by Metallurgist Bulfried of Salt Lake, Utah, to get the copper out of the amalgam direct. The treatment is said to be feasible and susceptible of great economy over present methods.

"CHLORINATION" does not appear in some of the dictionaries, but it is a regular word coined by the prescriptive right of genius. It was first used by its inventor, G. F. Deetken of Placer county, Cal., and first appeared in this paper in 1860.

TO BRONZE COPPER, scour the metal thoroughly; mix castor oil, 20 parts; alcohol, 80 parts; soft soap, 40 parts; water, 40 parts; apply this mixture with a brush; leave on till the required shade is obtained, dry with hot sawdust and coat with a very dilute varnish.

A MIXTURE of mica, axle grease, tar and summer oil, the latter two to be free from acid, is recommended as a lubricant for wire rope or flat cable. Various standard preparations, their composition and how to use them for preserving cables have been published herein from time to time.

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THERE is unavoidable repetition of various matters in these columns, though constant effort is made to reduce such repetition to a minimum. When extended information is asked reference is sometimes made to preceding numbers containing the desired answer, but it occasionally happens that the question is reanswered, and, to be technically correct, it is often the case in such instances that the terms used must, necessarily, be the same, as any variation therefrom would be inexact and misleading.

CONCERNING loss of gold and silver during scorification assay the result of a large number of assays gives the average loss by the entire process 2.54%, of which 1.99% was in cupellation and 0.55% in scorification. With gold, the loss in the entire process averaged 0.87%, of which 0.296 was in cupellation and 0.574% in scorification.

VARISCITE is found at Cedar valley, Utah Co., Utah, about four miles from Mercur, in metamorphic limestone. It is a green mineral, of composition similar to turquoise, its base being a hydrous aluminum phosphate, its coloring principle being occasioned by iron or manganese. It is susceptible of high polish, and makes a beautiful gem.

INDUSTRIAL CHEMISTRY is a most important study, as to chemistry as much as any other one branch of science is mining and metallurgy indebted for advance and economic improvement. The application of chemistry has diminished cost, created markets and made profit possible in enterprises formerly carried on, if at all, at a loss.

FOR mining purposes British Guiana is divided into five districts. The local mining laws provide that no placer claim shall exceed 1500 feet in length or 500 feet in width and that no one person shall hold more than five placer claims in one district. The government royalty is 90 cents on each ounce gold, and 4 cents on each ounce silver.

LIQUID CHLORINE has not worked well, not being economically satisfactory in California or Colorado, where bleaching powder is preferred. It is prepared by liquefaction with a special form of pump, and is kept and carried in steel cylinders. Its density is about 1.33; at 15° C. its pressure is six kilograms; at 35° C. it is ten atmospheres.

WHAT kind of battery is best for home use to run one or two hours depends for what purpose one wishes the battery. If for bell ringing, or such intermittent work, then what are called "open circuit" cells are what is wanted. If for long-continued use, or where large current is required, then a gravity battery or one of the two-fluid non-polarizing cells would probably be best.

IN assaying copper materials for gold and silver sodium chloride is employed by some assayers to separate the silver alloy with metallic gold after dissolving the material in nitric acid; but should this salt be used carelessly, or in excess, there is danger of losing some gold from the formation of a little aqua regia in the liquid. Sodium chloride solution may be added drop by drop until all the silver is precipitated.

IN an 850-pound stamp the shoe would weigh 358 pounds; the head, 228; tappet, 112; shoe, 152. The ordinary arrangement of battery drop in a 5-stamp mill is 1, 4, 2, 5, 3. The ordinary shoe will last five months; to furnish amalgam for 15,000 tons free-milling ore ten flasks mercury should, ordinarily, be sufficient, about 15 dwts. per ton. The average life of a brass wire screen, 30 mesh, is about three weeks.

IT has been frequently asserted that ores should be dead roasted, and the required proportion of sulphur made by adding raw ore, but smelter superintendents and managers do not consider this uniformly correct. It is often the case that complete roasting is not needed, as, for instance, with silver-bearing copper pyrites, which, in order to obtain a good matte, should contain from 10% to 12% of sulphur after roasting.

WHAT is said to be the deepest oil well in America is in the Monongahela river valley, 25 miles from Pittsburg, Pa. The hole has been drilled to a depth of 5532 feet, but the work has been suspended owing to a break in the 2¾-inch rope used. As a result, 1000 feet of rope and a string of tools are at the bottom. Experts are at work and hope to be able to resume drilling soon. It is proposed to sink the well to a depth of 6 000 feet.

IN OCTOBER, '96, a high electrical authority announced that while 15,000 volts were being successfully transmitted thirty-five miles, yet it was manifest that the transmission of 20,000 volts 50 miles marked the ultimate limit of successful electrical operation. Since then, in southern California, a 33,000 voltage has been successfully transmitted 65 miles, and now, in central California, a San Francisco organization is preparing to transmit the same pressure 150 miles.

THERE seems to be considerable difference of opinion among mill men as to whether hard or soft rolled copper is best for amalgamating plates, though the preponderance of practical testimony favors the soft copper, as it retains the mercury and amalgamates more readily than the hard. Those who favor the former say that hard copper has the advantage of not absorbing so much amalgam. As to the thickness of the plates, the same difference of opinion prevails: ⅛-inch is in common use; some mill men find $\frac{1}{16}$ or $\frac{3}{32}$-inch works well for apron plates and ⅛ to $\frac{3}{16}$-inch for inside plates.

PROBABLY the superintendent was right in refusing admission to the mine. The motives of mine managers and superintendents in declining underground inspection to unauthorized persons are often misunderstood. It is not "surliness" nor a fear that the visitor "might find something out" that impels such refusal, but a fear that the visitor may not be able to take care of himself. A mine is not the safest place in the world for an inexperienced man, and should an accident happen, resulting in serious personal injury, the superintendent would be the first one blamed.

FUEL BRICKS of crude petroleum are made in Europe. The mixture is in proportion of one liter of petroleum, 10% resin, 150 grams powdered soap, 333 grams caustic soda; the mixture is heated and stirred at the same time; solidification begins in about ten minutes; if there be a tendency to continue liquid, a little more soda is added. The mixture is stirred until the mass becomes nearly solid. The thick paste is then poured into molds, which are placed for ten minutes in a drying oven. After cooling, the briquettes are ready for use.

WHERE one purchasing a mining claim from a person engaged in litigation concerning it agrees to pay the price into the court at the end of a year if the suit is not then determined, to abide the result thereof, he cannot escape making such payment on the ground that his deed failed to include the most valuable part of the claim, when it appears that he has brought an independent suit to reform the deed. The purchaser, in such case, is liable for interest during the time he withholds the money, although the agreement makes no mention thereof, if he is in possession of the mine and engaged in working it.

THE reason that shifting the brushes on a dynamo causes the sparking to cease is because the sparking is due to a shifting of the neutral line caused by armature reaction. As this neutral line shifts, the brushes must also be shifted to follow it, otherwise sparking will result. In a two-pole machine, for instance, the current in the armature coils tends to form poles in the armature at right angles to the poles induced in it by the fields. The result is a pair of compromise or resultant poles which are at right angles to the line of commutation. As the current in the armature increases, the armature poles become relatively stronger and the compromise poles will be shifted in that direction, so that the brushes, if not moved also, will communicate while the coils are cutting lines of force and therefore generating an electromotive force.

IT were difficult to fix upon the money value of a life in a way that would admit of general acquiescence. The economic value of an individual is what he has cost his family, the community, the State, for his living, development, and education. It is the loan which the individual has had from the social capital in order to reach the age when he can restore it by his labor. Just what this value is in dollars and cents can not be accurately determined. English statisticians figure that an English farm laborer is worth $980: French militarists say a French soldier is worth $1200: in this country judges and juries have put $5000 as the individual's value. New York courts think $4000 is fair: Pennsylvania places the value at $3000. These figures seem low. What would appear a better basis is to calculate the amount of production: a man earning, say, $20 per week, or $1000 per year, represents an investment bringing in so much. At ruling interest rates —5%—it would take $20,000 to earn $1000 per annum, and any machine, human or otherwise, netting so much, may be considered worth the amount stated.

THE purchase by a corporation of a part of its own stock, until reissued by the corporation, in effect reduces its stock to that extent; and the sale by it of its property and franchises does not carry with it the shares of its own stock bought in by the corporation for delinquent assessments of a stockholder. These results rest upon several propositions of law. The capital stock of a corporation, previous to its issue, cannot in any proper sense be called the property of the corporation. Stock in a corporation represents an interest in the corporate property, and is evidence that the lawful holder is the owner of an interest therein in the proportion that his shares bear to the whole number of shares issued and held by the stockholders. The legal title to the property, represented by the stock, is vested in the corporation for the benefit of the stockholders. So, if a corporation has power to reduce its capital stock, it may effectually do so by purchasing and retiring a portion of its shares. So long as it remains in the treasury it represents no part of or interest in the property of the corporation. It is then as though it never existed.

DRAWBAR pull, measured in pounds, is the number of pounds that would be registered on a spring balance if the latter formed a connecting link between the pulling and the pulled object; if a cord were attached at one end to the ceiling, and suspended at the other end a spring balance to which was attached a weight of 100 pounds, the register on that balance would be 100, and one might say that the drawbar pull under these conditions would be 100 pounds. Should the string be cut loose from the ceiling so that the string, balance and weight were free to fall, there would be no longer any tension on the string or balance, the latter would register 0, and the drawbar pull would be 0. If, however, one should retard the fall of the combination by supplying friction to the string, the balance would register something, depending upon the amount of friction which the weight overcame. In the first two cases the drawbar pull would be doing no work, and could not be translated into horse power, because the term "horse power" implies a rate of doing work. In the third example it would be translatable into horse power if one knew just how much friction it was overcoming and the rate at which it accomplished this work; but as the question stands it cannot be expressed in horse power.

"Masonry Dams and Retaining Walls."

To the Editor:—I have read with great interest the exhaustive engineering article written by Mr. Geo. T. Pardoe, that appeared in the five issues of the paper ending March 17, and, while it is of approximate value, I do not think it gives correct results, as he appears to carry a considerable and indeterminate error all the way through.

Mr. Pardoe assumes that the point of application of the resultant of the horizontal pressures against any section will be at a depth below the surface of water equal to two-thirds the depth from surface of water to the base of the section considered. This is true in the very rare instances where the water is just level with the top of the wall. In the case he assumes for illustration (water flowing 3 feet deep over the crest), it is not true. Neglecting, as he does, the fact that this depth of water adds a stability of some 187 pounds per square foot of base to the section considered, the formula for height (or depth) of center of pressure becomes

$$H = \frac{2}{3}\,\frac{X^3 - Y^3}{X^2 - Y^2}$$

where X is the distance from surface of water to base of section considered and Y is depth of crest of dam below the surface.

Applying Mr. Pardoe's formula, to a section 6 feet high with 6 feet of water over the crest his point of application is 4 feet above the base, or two-thirds the height of the section, while if we consider a section 4 feet high with 8 feet of water over it he would make the c. p., as before, 4 feet above the base or just at the top edge of the dam, and lastly, as a reductio ad absurdum, if the section remain 4 feet high and the water be 11 feet over it, his rule would place his resultant pressure 5 feet above the base or a foot above the top of the dam in the flowing water, which is equivalent to saying if you increase the depth of water enough you will have no pressure at all on the wall which sustains it.

If D is the height of the dam, or of that section of the dam considered, and W the depth of water above the crest of the dam, and H the height of center of horizontal pressure above the base of it, Mr. Pardoe's theory may be formulated as $H = \frac{D+W}{3}$. Now, when the water is just level with the crest, W equals O and H becomes $\frac{1}{3}$ D, which is correct. When the depth of water increases to twice the height of the dam, H becomes equal to D, or the center of pressure is at the upper edge of the dam—manifestly incorrect.

If we increase the depth still further and W becomes greater than 2 D, H will become greater than D, or, in other words, the center of pressure will be above the top of the wall, out in space in a free-moving fluid.

Now, since our center of pressure on a body is merely a point at which may be applied a single force the resultant in magnitude and direction of all the forces acting upon that body, replacing all of them, it becomes manifestly impossible that the point of application of such resultant can lie entirely outside such body and disconnected therewith. If following an hypothesis leads to such a result, it is very bad for the hypothesis.

Suppose, for instance, a dam 10 feet high, over which passes a flood to a depth of 21 feet. By the Pardoe rule, all the thrust on the dam may be concentrated at a point at a height above the base equal to 10 feet plus 21 feet divided by 3, equal to 10 feet 4 inches above the base, or 4 inches above the top—a manifest absurdity. I do not know just what would be the result, but presume the center of pressure would float away down stream, carrying with it its attached resultant force, and both would be irrevocably lost. Not only would this be fraught with unknown dangers to the dam, thus suddenly bereft, but, further, a cloud would be cast upon our sacred law of the conservation of energy. You can not go on losing resultant, or any other kind of forces, out of the world with impunity.

I have sketched two diagrams for the height of center of pressure of various heights of dam, each with varying depths of flood on the crest. The first shows the heights of center of pressure above the base of a 10-foot dam for varying heights of water upon the crest, the second the same for a 20-foot dam; the upper line in each case being derived from the Pardoe rule, and the lower one by the rule given above; that is, that the center of pressure is at a depth below the surface of the water equal to

$$\frac{2}{3}\,\frac{X^3 - Y^3}{X^2 - Y^2}$$

which depth we will call "N," where X is the depth of base of dam below water surface and Y is depth of crest of dam below the same point. We can convert this equation into a form corresponding with the one in which I have formulated Pardoe's rule, by remembering that in the above X is equal to D plus W, and Y equals W, whence X minus Y equals D. Then, since H plus N must equal D plus W, we have H equal to D plus W minus N or H equals

$$D + W - \frac{2}{3}\,\frac{(D+W)^3 - W^3}{(D+W)_2 - D^2}$$

a simpler equation than it looks to be, which I have called formula 2.

In the diagrams the lines of H coincide at $\frac{1}{3}$D when the flood depth is zero, and thence diverge. By Pardoe's rule the line of height of center of pressure for varying pressures on the same dam is a straight line, rising 1 foot in 3, and passing outside the dam when W becomes equal to 2D. By formula 2 this line becomes a curve, probably a parabola, and in a general way it appears that beyond the point where W equals 2D (at which point H always equals $\frac{4}{9}$D) the increase in value of H for increased flood depths becomes almost inappreciable. Now, the divergence between these two lines measures the constantly increasing error in the Pardoe rule, and it affects the design of the dam thus:

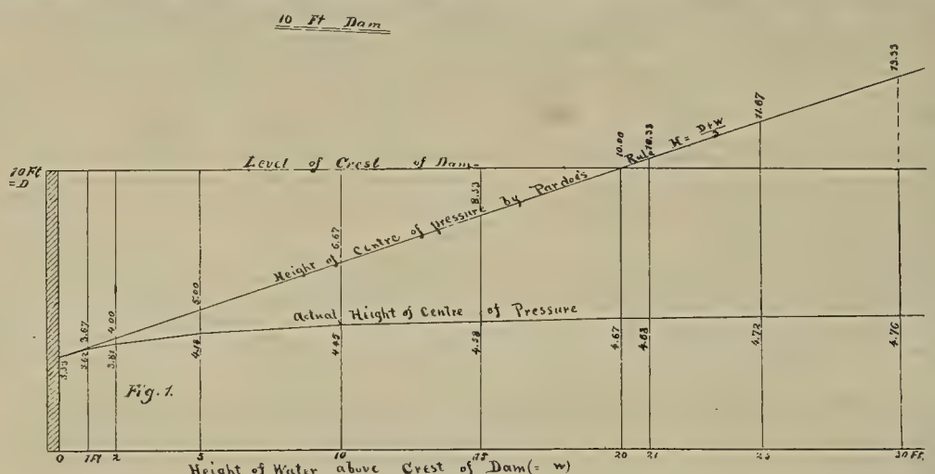
Since the direction of the resultant pressure (i. e., its angle of dip, so to speak) is fixed in all cases by the ratio which the horizontal pressure through the center of pressure bears to the vertical pressure due to weight and acting through the center of gravity, any increase of H must cause the resultant to cut the base at a greater distance down stream from the vertical through the center of gravity. Now, by the rule of avoiding tensile strain in such structure, this line may not cut the base nearer than one-third the thickness from the face of the wall, so that the thickness of the dam at any joint will be increased by $\frac{2}{3}$ the distance that the foot of this resultant is erroneously moved down stream.

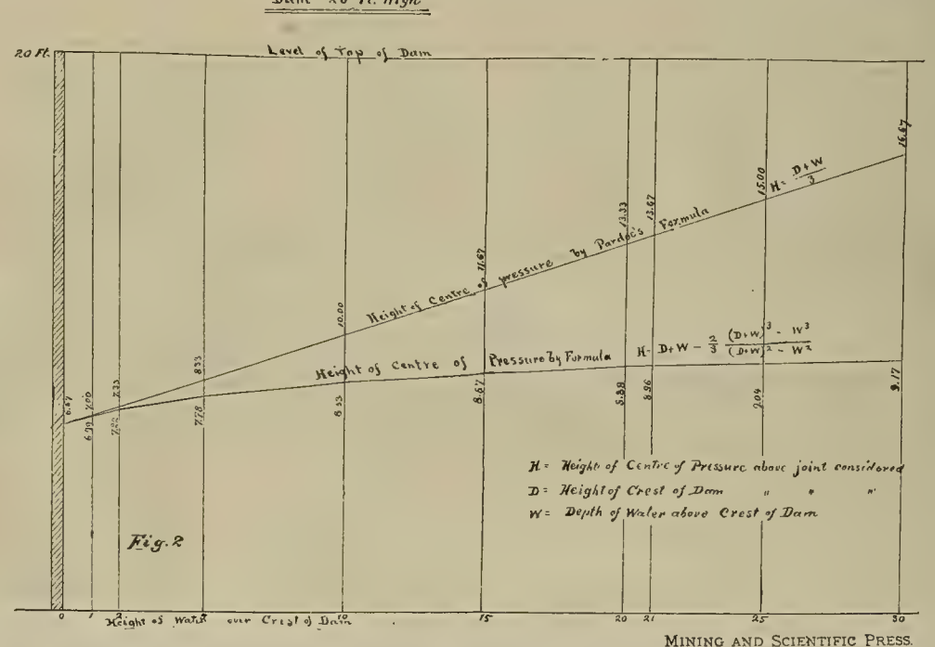
In an ordinary masonry dam of average materials and dimensions this widening of the joint will amount to about three-fourths the height through which the center of pressure is wrongly raised. Inspection of the diagrams will show that within reasonable limits this thickening may amount to from 3 to 6 feet, and for a dam 50 feet high and 200 feet long it would be from 1000 to over 2000 cubic yards, which at $8 to $15 per yard runs into money pretty fast.

It is no more an engineer's duty to build safely than it is to build economically. If he is worth anything he should do both, although I remember that one of the best things Arthur Wellington ever wrote was that the layman is prone to judge the engineer by the piles of earth, stone, wood and iron he has made, rather than by those he has avoided making.

In further criticizing the paper, which as a whole had much in it of value (I enjoyed reading it and got some suggestions from it even if I did not agree with it all), I think the last installment was not up to the standard of the other parts. The reference to a weir as a low, unimportant structure which might be made of sticks and mud was rather unfortunate on the tail of a four weeks' discussion of masonry weirs from a mathematical standpoint. Colloquially, "dam" means almost any structure to hold up water. When the engineer differentiates it is into "dam" as a retaining wall simply and "weir" as a structure designed to carry a flow of water over its top. This was the kind of a structure Mr. Pardoe selected as a type to illustrate. Johnstown, Williamsburgh, Austin, and some others tell the story of making "weirs" of sticks and mud. I except to the statement that in using Portland cement the limit of proportions should not exceed 2½ sand to 1 cement. The best practice is nearly all outside that limit, and 3 : 1 may be taken as average first-class practice, save for facings and specials.

R.





Loss of Energy in Production of Light.

There is a great loss of energy in the manufacture of light through the agency of the steam engine. In practice not more than 7% to 16% of the energy of the fuel used can be realized through the engine, and theoretical considerations establish a limit at 30%. This problem is not unsolvable if there can be devised some means of extracting the energy of coal otherwise than by heat—say in some such manner as that in burning zinc in a voltaic battery.

In the second stage of the operation of producing the electric light, the dynamo is already so nearly perfect that hardly any heat is lost in its conversion into current.

The third stage brings us to the lamp, with 7% of the original energy still available. The only means thus far available for producing luminous energy is

to heat the molecules of some substance, and in this operation we are compelled to waste the greater portion of our available energy in producing heat before we obtain the light rays.

Here, then, is the second unsolved problem, since even in the incandescent lamp and the arc lamp not more than from 3% to 5% of the energy supplied is converted into light. Thus, of the original store in the coal less than three parts in a thousand ultimately become useful. In the last few years, however, some hints of means to overcome the difficulty have been obtained from the proof by Maxwell and Hertz that light is only an electric radiation. Could we produce electric oscillations of a sufficient rapidity, we might discard the molecules of matter, and directly manufacture light without their intervention. To do this we must be able to produce oscillations at the rate of 400,000,000,000 per second. Tesla has produced them in thousands and millions per second, and Crookes has shown how, by means of high vacua, to raise many bodies to brilliant fluorescence at a small expense of energy. These are hints toward a solution of the problem, but give no solution as yet. Prof. Langley states that the firefly spends the whole of its energy upon the visual rays without wasting any upon heat, and is some four hundred times more efficient as a light producer than the electric arc. We have no solution of these problems, but have reason to hope that in the near future one may be obtained, and the human inventor may not be put to shame by his humble insect rival.

Removal of Rocks in San Francisco Harbor.

(Continued from page 517.)

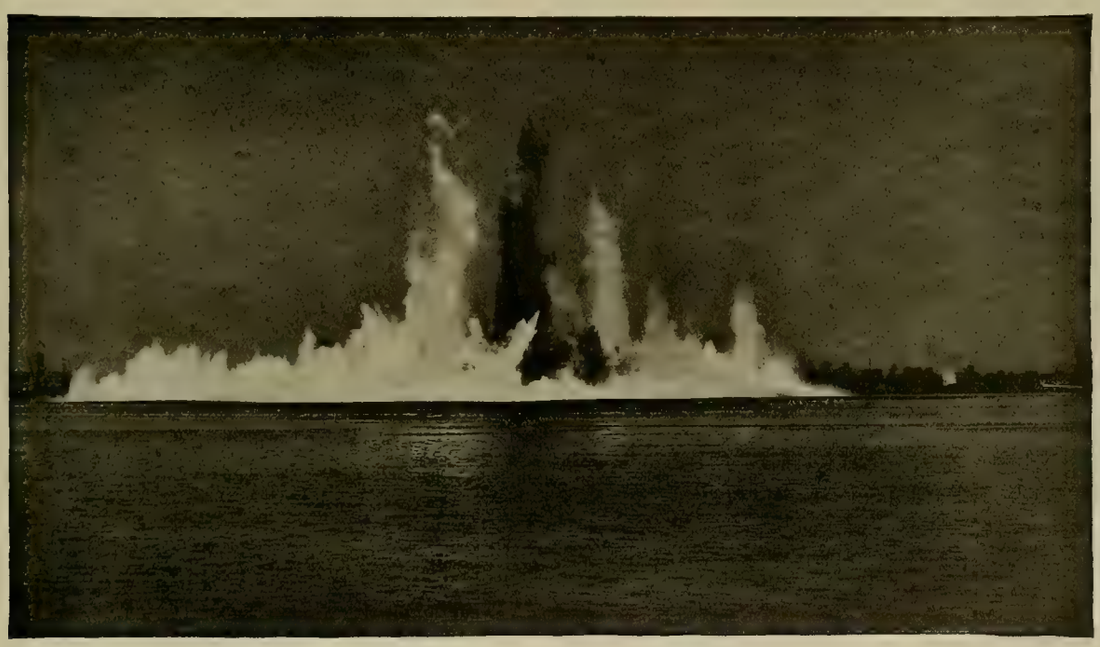
which the drills were operated. A mast 68 feet high and 2 feet square, composed of four timbers 12x12 inches, bolted together, was erected upon the rock. This was maintained in a vertical position by four double steel-wire guys 1¼ inches in diameter anchored in the bottom of the bay. The upper part of the mast was rounded to 18 inches in diameter for a distance of 15 feet, where an 18-inch ball-bearing collar was located, from which the table was suspended by 1¼-inch steel wire cables. This was 160 feet long, 25 feet wide and hung 13½ feet above low water. The framework composing this swinging platform consisted of four stringers, each made up of four timbers 3x12 inches, bolted together and secured by 1-inch straps to cross ties, 8x10 inches, 20 feet apart. There were used 16,319 pounds of nitro-gelatine containing 90% of nitro-glycerine, which was furnished in cylindrical pasteboard cartons weighing between fifty and sixty pounds. The amount contained in the holes varied from 345 to 1067 pounds.

The electrical appliances for the explosion were arranged by F. Broili of the California Electrical Works. The electric fuses were insulated into the gelatine and several sticks of giant powder laid in to make explosion doubly sure. The wires connecting with the water-proof fuses were fastened to ropes wrapped around the gelatine. Two cylinders of the explosive were thus prepared, lowered into each hole and covered with 50 to 100 pounds more in small pieces. The fuses were run in two independent circuits, and each circuit had two fuses, or four in each hole. One terminal of each circuit was grounded by connecting it with the steel cable used to support the insulated cable, and the other terminals were connected to above-mentioned insulated cable. Before connecting with the cable, each circuit was tested for insulation and resistance with a low E. M. F. and a voltmeter. The fuses were exploded from a barge about a mile distant by means of 120 cells of Mesco dry batteries. The explosion followed the closing of the switch apparently instantaneously.

Before the explosion took place the platform was removed, and only the mast, guy wires (which had been connected to floating buoys) and some framework around the pipes, so the electric wires could be connected, remained.

It is interesting to note that no outrushing concentric waves were made, and to those persons on the barge to the leeward no vibration of air was felt; the sound made was about as loud as a pistol shot, but not so sharp, and comparatively few fish were killed. Triangulation from Angel island showed that portions of the disintegrated rock were carried to a height of 996 feet.

This is one of the largest enterprises of the kind in the history of removal of such obstructions. After the explosion there was 14 feet of water where the main rock stood, and the contractors claim that, by subsequent dredging, the required depth of 30 feet will be secured, the assumption being that, after the explosion, much of the shattered rock settled back in its original position. Herewith is an engraving of the explosion of Flood Rock, Hell Gate, New York harbor, procured to accompany this article. Flood Rock was mined out, leaving only a thin shell, and then a giant blast blew the remaining rock into fragments, which were then removed by dredgers. Other rocks have been removed by drilling holes in the rock by machines carried on scows or on platforms set on spuds, which rested on the bottom, charging the holes with explosive and firing by electric current, thus removing slab after slab from the side of the rock, as in quarrying. The debris has to be gathered up by a dredger, as in this instance. Other rocks have been removed by special methods designed by the contractors.



View of Explosion of Flood Rock in Hell Gate, N. Y.

Illustrating the most prominent case of submarine mining. Little giant drills were selected for greater part of work of excavation.

Prehistoric Gold Mining in Africa.

When I went into the Geelong ancient stopes (which are left intact) I spent considerable time fossicking about at depth. I was happy, in turning over the debris, in coming upon two granite balls, bearing evidence of having been used as hammers, almost exactly round and about the size of two hands clenched. In parts the ancient stopes were very narrow, and one had to penetrate to cavities (stopes) of not more than 2 or 3 feet from roof to foot wall. In other parts the stopes were quite cavernous. In the latter the wall was frequently alcove in character, smooth, and in parts still black from smoke, and among the debris were remains of charcoal. It is believed (and I can quite credit the theory) that the procedure of the ancients was to light fires in the stopes and then, when the gold-bearing rock cooled, to use granite hammers to break down the ore. To go further, the chipped-off gold-bearing rock would probably be put into the native baskets and carried to the surface. I found occasionally at the top of the kopjes, or little hills, where there were little masses of hard rock, patches of indentations in flat areas of rock, just as though mortars had been sunk into the rock. Beside the pots were numerous slight elongated indentations. It would seem from other rock implements of grinding character that the indentations were made in the process of grinding the rock flakes into powder, after the rock, roughly broken out in the stopes, had been broken up small.

In nearly all cases mines are near pools or streams and frequently by the sides of these bodies of water are found rock pots somewhat similar to those found on the kopjes. We can imagine that the powder was deposited in these rock pots, flushed with water, the sand driven off and the gold, sinking in the bottom, was eventually collected.—R. R. Mabson, Engineering Magazine.

Modern Boiler Making.

During the past twenty years the boiler shop has undergone a change, the magnitude of which is paralleled only by that in the machine shop. But while the latter has been mainly brought about by the introduction of new and improved machine tools, the former is due chiefly to the development of a new material—steel. But for this, the old methods which were applicable to wrought iron would probably have not been altered much even at the present time.

There are many points in common between the machine shop of to-day and that of twenty or thirty years ago, but there are scarcely any between the boiler shops of the two periods. Twenty or twenty-five years ago few firms were making steel boilers; to-day the construction of new iron boilers is becoming exceptional. With the new material nearly every machine used, nearly every shop method adopted, nearly every detail of the work has been altered or modified in a greater or less degree. Hand work, too, is practically extinguished in the most modern shops. Formerly there was a good deal of flanging, bending, hammering, chipping, welding, riveting drifting, and tapping done by hand, as there is still in small establishments; but good boiler work is now almost entirely a matter for machine tools, and the importance of these, therefore, has grown to an immense extent. A high-class modern boiler is now machine-made almost entirely from beginning to finish. Since the errors of hand work are thus eliminated, two boilers made to the same standard are exactly alike and afford a striking illustration of the excellence of the machine work now done in the boiler shop.

Boiler making, to be carried on according to the best modern methods, requires a very large plant—so large that many a well-sized shop cannot afford it all. With only a moderate amount of machinery good work can be done, but it has to be done in a more roundabout way, with considerable increase in cost, which, as in other departments, sorely handicaps such firms in competition with the big shops.

At the present time there are four power agencies in use in boiler shops. Steam and water vastly predominate; nearly all the heavy machinery is driven by these agents. Air is chiefly used for operating small tools, such as drills and calking hammers, while electricity is employed for the same purpose for driving heavy machine tools. Steam, water and air are each suitable for riveting, though the first has been largely displaced by the last. Water power is adopted for heavy flanging, shearing and punching; steam is employed for bending rolls, drills and most of the machine tools used for cutting purposes. Any large modern boiler shop, therefore, must needs be in possession of at least three power plants—steam, water and air—to which it may be desirable to add the electric motor. The applications of compressed air are growing at a phenomenal rate, being applicable to all the small portable tools used in boiler work. In large shops, in which numerous machines are widely scattered, any agency seems better than shafting and belting, and before long we may anticipate that the extension of the uses of air for small tools will be paralleled by that of electric driving for heavy tools, in place of belts and independent engines.—Joseph Horner, in Cassier's Magazine for May.

AS INDICATING that the mail routes in Alaska are practicable, and that the carriers there are giving prompt service, it is said at the Postoffice Department that a letter mailed at Cape Nome, February 10th, reached the following places on the dates named: Circle City, April 1st; Dawson, April 11th; Seattle, April 29th, and Washington, D. C., May 5th. Prior to this season it has been impossible to get mail from these northern points after December 1st.

Mineral Product of California for 1899.

State Mineralogist A. S. Cooper reports the yield and value of the mineral substances of California for 1899 as follows, as per returns received at the State Mining Bureau in answer to inquiries made to producers:

Antimony	75 tons	$13,500
Asbestos	30 tons	750
Asphalt	15,060 tons	308,130
Bituminous rock	40,321 tons	116,097
Borax	20,357 tons	1,139,882
Cement	60,000 bbls	180,000
Clay brick	125,950 M	754,730
Pottery	40,600 tons	42,700
Coal	160,941 tons	420,109
Copper	23,915,486 lbs	3,990,534
Fuller's earth	620 tons	12,400
Gold		15,336,031
Granite	128,924 cubic feet	141,070
Gypsum	3,663 tons	14,950
Lead	721,000 lbs	30,642
Lime	299,854 lbs	314,575
Limestone	30,769 tons	29,185
Lithia mica	124 tons	4,600
Macadam	323,590 tons	239,867
Magnesite	1,280 tons	18,480
Manganese	295 tons	3,165
Marble	9,682 cubic feet	10,550
Mineral paint	1,704 tons	20,294
Mineral waters	1,338,537 gallons	406,691
Natural gas	115,110,000 cubic feet	95,000
Paving blocks	305 M	7,861
Petroleum	2,677,875 bbls	2,660,793
Platinum	300 ounces	1,800
Pyrites	5,400 tons	28,620
Quicksilver	29,454 flasks	1,405,045
Rubble	641,308 tons	547,025
Salt	82,654 tons	149,588
Sand glass	2,000 tons	2,000
Quartz	1,000 tons	1,500
Sandstone	56,264 cubic feet	103,384
Serpentine	500 cubic feet	2,000
Silver		504,012
Slate	810 squares	5,900
Soda	10,000 tons	250,000
Total		$29,313,460

In the previous year the total product was valued at $27,289,079; so the average increase for the year is $2,024,381. The total product of metallic substances for the year 1899 was $21,305,023—an increase of $1,281,989. This includes gold, silver, mineral paint, quicksilver, antimony, copper, lead, manganese and platinum. (Silver is given in commercial value or amount received for it by producers. The coining value of silver would be $1,106,578.)

The total value of non-metallic substances was $2,446,070—an increase of $343,998. This includes borax, coal, mineral waters, salt, asbestos, gypsum, magnesite, pyrites, lithia mica and fuller's earth.

The total value of hydrocarbons and gases was $3,180,020, an increase of $109,426, including asphaltum, bituminous rock, natural gas and petroleum. The total value of structural materials was $2,382,347, an increase of $288,968. This includes brick and pottery clays, hydraulic cement, lime and limestone, macadam, rubble and concrete rock, paving blocks, marble, granite, sandstone, serpentine, slate, quartz sand and glass sand.

The relative value of the principal mineral products of the State is as follows: First, gold; second, copper; third, petroleum; fourth, quicksilver; fifth, borax.

There are 24,991 men employed in the industries represented in the above table, with the exception of the petroleum industry. In that branch so many new wells were being opened at the close of the year, and still unproductive, that it was found impossible to make a proper enumeration of the number of men employed. None are, therefore, credited to that industry.

The relative rank of the counties of the State, in point of mineral production, is given in the following table. In each case the value given includes that of all mineral substances combined produced in the respective counties for the year. Some counties produce, in addition to gold and silver, five, six or seven other substances, while other counties, which produce little or no gold or silver, produce in large quantities quicksilver, mineral oils, copper, lead, asphalt, structural materials, etc. The figures include aggregate value of all mineral products, including precious metals. These latter are based upon U. S. Mint returns for the year. The term "undistributed" includes total value of such substances as are grouped to avoid disclosing private business, as in the case of single operations in a county. In the large and complete table published in Bulletin No. 17 by Charles G. Yale of the State Mining Bureau, from which these figures are taken, the amount and value of each substance in the respective counties is set forth. It is, therefore, necessary in some cases to place the figures in the "undistributed" column:

1—Shasta	$ 4,661,980
2—Nevada	2,231,898
3—San Bernardino	1,859,351
4—Los Angeles	1,729,964
5—Tuolumne	1,650,880
6—Amador	1,593,720
7—Calaveras	1,303,188
8—Placer	1,177,812
9—Kern	1,027,366
10—Siskiyou	991,871
11—Mono	749,556
12—Trinity	715,595
13—Napa	701,416
14—Ventura	613,450
15—Mariposa	565,636
16—Alameda	508,799
17—Butte	504,795
18—Fresno	497,234
19—Inyo	473,851
20—Sierra	450,474
21—El Dorado	425,346
22—Santa Clara	391,940
23—San Diego	381,215
24—Plumas	381,166
25—Santa Barbara	318,528
26—San Benito	290,495
27—San Francisco	275,694
28—Riverside	272,848
29—Santa Cruz	251,392
30—Humboldt	235,274
31—Sacramento	233,755
32—Lake	204,103
33—Yuba	189,939
34—Sonoma	142,330
35—Contra Costa	135,113
36—Madera	115,620
37—Orange	112,077
38—San Joaquin	111,880
39—Marin	81,150
40—San Luis Obispo	68,548
41—San Mateo	58,225
42—Lassen	28,898
43—Tulare	20,810
44—Tehama	19,800
45—Monterey	17,378
46—Solano	16,937
47—Stanislaus	11,769
48—Kings	11,550
49—Mendocino	8,788
50—Del Norte	4,450
51—Colusa	1,420
52—Yolo	384
Undistributed	485,802
Total	$29,313,460

All the asbestos produced in California in 1899 was from Riverside county. Asphalt was produced in Fresno, Kern, Los Angeles, Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Clara and Ventura counties. Bituminous rock came from San Benito, San Luis Obispo and Santa Cruz. The borax yield was from Inyo, Kern, San Bernardino and Ventura. Brick clays were utilized in Alameda, Butte, Fresno, Humboldt, Kern, Kings, Los Angeles, Madera, Marin, Mendocino, Monterey, Orange, Riverside, Sacramento, San Bernardino, San Diego, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Shasta, Sonoma, Tehama, Tulare and Ventura countries.

Pottery clay came from Amador, Placer and Riverside. All the hydraulic cement came from San Bernardino county. Coal was produced in Alameda, Amador, Contra Costa, Kern, Orange and Riverside. The copper was mined in Calaveras, Nevada, San Bernardino and Shasta counties. The pyrites were all from Nevada county. Granite was quarried in the counties of Madera, Placer, Riverside, Sacramento, San Bernardino, San Diego, Sonoma, Trinity and Tulare.

All the fuller's earth came from Kern county. Gypsum was produced in San Benito and Los Angeles counties; and lead was from Inyo, Mono and San Diego counties. Lime and limestone were quarried in El Dorado, Kern, Mono, Monterey, Riverside, San Benito, San Bernardino, Santa Clara, Santa Cruz, Shasta and Solano counties. San Diego county was the only producer of lithia mica.

The principal macadam quarries are in Alameda, Los Angeles, Marin, Sacramento, San Benito, San Bernardino, San Francisco, San Mateo, Santa Clara, Santa Cruz and Solano counties. The magnesite came from Napa and Santa Clara counties; and the manganese from Alameda and Santa Clara. Marble was quarried in Amador, Los Angeles and San Bernardino counties.

Mineral paint was mined in Butte, Calaveras, Nevada and Stanislaus counties. The mineral springs which utilize the water commercially are in Butte, Colusa, Contra Costa, Fresno, Humboldt, Lake, Los Angeles, Mendocino, Monterey, Napa, San Benito, San Diego, Santa Barbara, Santa Clara, Shasta, Siskiyou, Sonoma, Solano and Tehama counties. Natural gas was utilized in Sacramento, San Joaquin and Santa Barbara counties. Paving blocks, or basalt, were quarried in San Bernardino, Solano and Sonoma counties.

The platinum came mainly from Trinity and Siskiyou counties. Petroleum was produced in Fresno, Kern, Los Angeles, Orange, Santa Barbara, Santa Clara and Ventura counties. Quicksilver came from Lake, Napa, San Benito, San Luis Obispo, Santa Clara, Sonoma and Trinity. Rubble was quarried in the counties of Humboldt, Los Angeles, Madera, Marin, Monterey, Sacramento, San Diego, San Francisco, San Luis Obispo, San Mateo, Solano and Sonoma. The salt came from Alameda, Colusa, Riverside and San Diego counties. The quartz sand came from Riverside. Sandstone was from Colusa, Los Angeles and Yolo counties. The serpentine was from Los Angeles, slate from El Dorado, Mariposa and Shasta; and soda from Inyo counties.

As far as "banner" counties are concerned in the different mineral products, the following is the record for 1899, with the values of material from the county named. Alameda leads: Salt ($137,088), manganese ($3090), macadam $66,512) and coal ($242,109). Amador leads in marble ($7925), Butte in mineral paint ($9900), El Dorado in slate ($4500), Inyo in lead ($28,135) and soda ($250,000), Kern in fuller's earth ($12,400), Los Angeles in gypsum ($14,250), petroleum ($1,409,356) and serpentine ($2000). Napa leads in magnesite ($17,130) and quicksilver ($598,320).

Nevada leads in gold ($2,171,510) and pyrites ($28,620), Placer in granite ($61,525), Riverside in asbestos ($750), pottery clay ($16,800) and quartz sand ($1500). San Bernardino has the most borax ($1,106,000), cement ($180,000), limestone ($14,810) and paving blocks ($4000), San Diego the most lithia mica ($4600). San Francisco leads in rubble ($221,230), San Joaquin in natural gas ($84,880), Santa Barbara in asphalt ($121,160), and Santa Clara utilizes the most brick clays ($170,455). Santa Cruz produces the most bituminous rock ($70,569) and lime ($176,893). The bulk of the copper comes from Shasta county ($3,565,023), and this county also leads in silver product ($196,213).

It is to be noted that only two counties have the lead in four things—Alameda and San Bernardino. Two also lead in three substances—Los Angeles and Riverside—and the counties of Inyo, Napa, Nevada, Santa Cruz and Shasta lead in two products. The other counties named only have the lead in one substance each.

Earth's Deepest Metal Mine.

The deepest hole ever dug in the earth for men to work in is the shaft of the Red Jacket copper mine at Calumet, Mich. Observers ascending in compartment balloons have secured data of importance regarding meteorological conditions, and underground observations made at a depth of a mile are no less valuable.

It had been thought that such a depth at the bottom of the Red Jacket shaft would have a temperature that would boil an egg. This was found not to be the case, however. Careful tests at the bottom show that the normal temperature at a mile below the earth is only 87.6° Fahr.

The water found at the bottom of the shaft is corrosive to human flesh. Workmen have to wear heavy rubber boots and rubber coats and masks to protect themselves.

The opening is 15½ by 25 feet inside the timbers, cut through adamantine. Giant timbers secure the transit ways for men and materials, for water and electric wires, which illuminate the shaft from surface to bottom. Inside the timbers are six compartments. In four of the compartments slip up and down the ponderous cages, carrying ten-ton loads of rock and moving at the speed of an express train. Up and down in these cages also ride the hundreds of men who work in the mine. In one of the compartments are the great iron pump pipes. In the last will be forced steady currents of compressed air, which runs the drills a mile below the engine house.

The electric light plant is large enough to supply light to a city. A telephone system connects every point of the shaft with a great central exchange above ground.

A network of wires stretches in to the headquarters of the fire department, near the big hole. Thousands of dollars have been spent to bring every part of the shaft within easy communication of the surface in case of fire.

Air as a Lubricant.

Ordinary air is now being used with good results for illustrating the action of a lubricant in a journal bearing in a machine designed by A. Kingsbury. The machine consists of a steel piston or short shaft to be rotated and a cast-iron ring or cylinder which acts as a bearing for the shaft, the whole being supported on rollers mounted on a suitable frame. The shaft weighs 50½ pounds, is 6½ inches long and 6 inches in diameter, and its weight constitutes the total downward pressure on the bearing. The diameter of the cylinder is slightly less than $\frac{1}{2000}$ of an inch larger than the shaft—a fairly loose fit. Both cylinder and shaft are ground exactly parallel.

The cylinder is set horizontally, the shaft inserted (both being perfectly clean and dry) and rotated with the hand by the handle at the end. It can be turned with difficulty at first, and the harsh, grating sound of metal rubbing on metal will be heard. With an increase of speed, however, this grating ceases, and the force required to turn the shaft is materially decreased until, after a few revolutions, the shaft becomes entirely free from the cylinder and rotates on the film of air between. Set rotating at, say, 500 revolutions per minute, it will continue to rotate four or five minutes. If allowed to run, the speed gradually decreases from the start until suddenly the piston breaks through the intervening layer of air, and a few more revolutions suffice to bring it to a sudden stop.

If a more conclusive proof is required that the shaft is entirely separated from the cylinder, an electric bell may be included in a circuit of which the shaft is made one terminal and the cylinder the other, when it will be found that the bell is silent as long as the shaft rotates at any considerable speed.—American Manufacturer.

Mining and Metallurgical Patents.

Patents Issued May 1, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

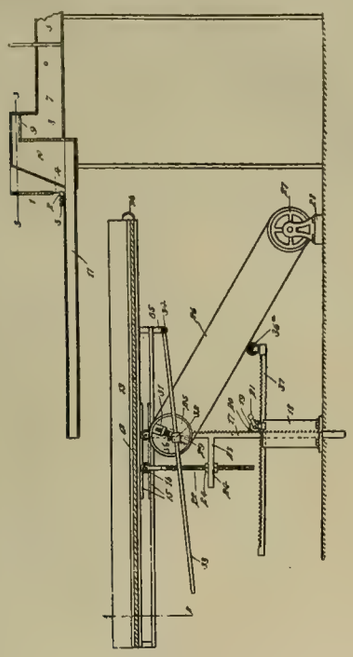
ALLOY.—No. 648,428; J. Patrick, Frankfort-on-the-Main, Germany.

Process for obtaining an alloy of nickel, magnesium and zinc, consisting of adding to nickel and a salt of magnesium, a flux adapted to form a cohesive slag and a reducing agent for magnesium salt, melting the mixture, and introducing zinc into the molten mass and maintaining zinc underneath the slag until it is melted, and finally adding copper to the molten nickel-magnesium mixture at any time with respect to the time of introducing the zinc.

PROCESS OF PRODUCING ALLOYS OF IRON AND TITANIUM.—No. 648,439; A. J. Rossi, New York, N. Y.

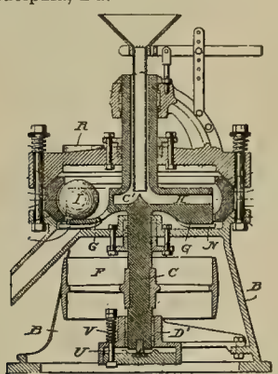
Process of producing compound or alloy of iron and titanium which consists in providing a bath of molten reducing metal the heat of the formation of whose oxide is at a given temperature greater than that of titanic acid; next supporting in bath in the presence of molten iron titanic acid, and developing in the charge a temperature sufficiently high to insure requisite reaction between reducing metal and oxygen of titanic acid leaving liquefied metallic titanium to become alloyed with liquefied iron.

CONCENTRATOR.—No. 648,458; C. Galvan, Zacatecas, Mexico.



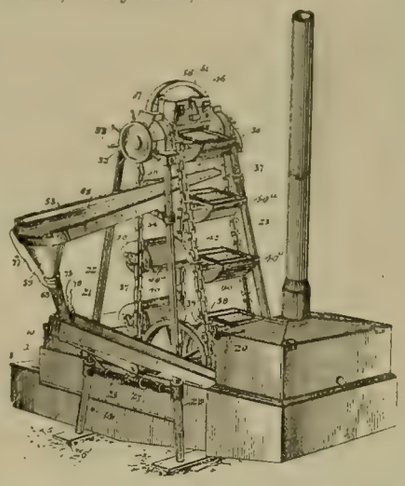
A concentrator having an ore-feed device, a concentrating table, a table-supporting frame adjustable vertically toward and from ore-feed device, a pulley on frame, means for vibrating table by rotation of pulley, a driving pulley journaled in stationary bearings, a belt connecting driving pulley with pulley on frame, tension pulley for belt, and an adjusting device for tension pulley, operated by adjusting movement of the table-supporting frame. A stationary driving pulley, belt connecting it with another pulley forming part of driving mechanism, a tension roller engaging belt, an approximately horizontal rack carrying tension roller, and an adjustable pinion engaging both racks.

PULVERIZING MACHINE.—No. 648,488; G. S. Emerick, Philadelphia, Pa.



A pulverizing machine, comprising lower supporting frame, grinding ring mounted thereon, upper frame resting on grinding ring, bevelled engaging surfaces arranged between frames and upper and lower edges of ring, bolts and springs for holding grinding ring in place between frames under yielding pressure, grinding balls engaging grinding ring, disk having ball sockets and driving arms, shaft carrying disk, step block supporting shaft in yielding manner to correspond with yielding action of grinding ring.

ORE SEPARATOR AND AMALGAMATOR.—No. 648,549; G. H. Cline, Jersey Shore, Pa.

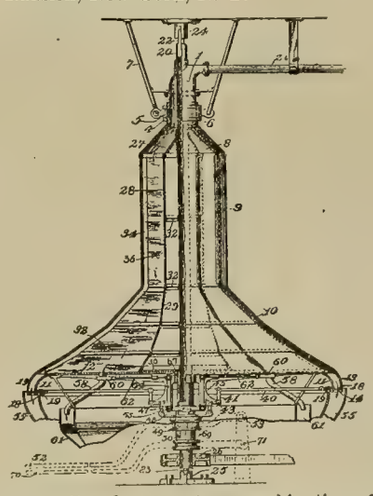


An ore separator and amalgamator, combination of sluice box, open-bottomed earth-receiving chamber arranged at one end of sluice box and communicating directly therewith, furnace arranged at end of sluice box opposite earth-receiving chamber, having flue connection with latter, washing screen located within open earth-receiving chamber, exposed directly to water within sluice box, elevated sluiceway and conveyer arranged to work in sluice box, and so propelled as to impart impulses to water in direction toward screen for washing contents of latter; damper-controlled flues extending through sluice box at sides and connecting furnace to dirt chamber, damper-controlled uptake extending through dirt chamber and communicating with furnace flues, endless bucket elevator arranged in upright position between furnace and dirt chamber, operating in sluice box between furnace flues.

PROCESS OF MAKING STEEL CASTINGS.—No. 648,510; A. G. Lundin, Boston, Mass.

Manufacturing steel castings, heating steel scrap in furnace and melting same to substantially boiling point; inserting in molten metal a small quantity of copper; allowing sufficient time for the copper to become thoroughly melted and mixed with the molten metal; inserting in the molten metal a small percentage of ferro-silicon; allowing sufficient time for ferro-silicon to become melted and mixed with molten metal; inserting in the molten metal substantially simultaneously small quantities of ferro-manganese and aluminum; and pouring molten mass of metal or alloy into a mold in the usual manner.

CENTRIFUGAL SEPARATOR FOR ORES.—No. 648,711; H. De Raasloff, New York, N. Y.



In a centrifugal separator, combination of shell having a progressively increasing outward flare toward the point of discharge of solid matter, an inlet at one end and an outlet for solid matters at other end thereof, outlets for liquids separate from outlets for solid matter, blades in shell adapted to impart rotation to contents thereof.

COMPOSITION OF MATTER FOR FURNACE LININGS OR OTHER PURPOSES.—No. 648,756; R. Keck, Denver, Colo.

Artificial stone, consisting of magnesium material, and binder or flux consisting of material of shale occurring in the Jura-Trias along eastern foothills of the Rocky mountains, being porous and bad conductor of heat, in the proportion of about two parts of flux to three parts of magnesium oxide and calcium oxide contained in the magnesium material.

Geology of Butte Copper Field.

During the progress of the Colusa-Parrot-Anaconda mining suit in the U. S. Circuit Court in Butte, Montana, many facts have been brought out concerning the geology of Butte and her copper-bearing lodes, says the Anaconda Standard.

Prof. Shaler said if you could pull out, so to speak—fancy that you could pull out—all the veins in this camp, all the mineral matter, there would be an entangle of slender passages or great passages, from one end to the other, through which some small animal could find its way.

In his study of the Anaconda vein he found it to be a remarkably uniform and even deposit. It has two great central horses, but is of a singularly even constitution. No sooner was he impressed with the steadfast quality of the vein upon his first examination than he began to be surprised when he came in contact with what is known in the suit as the diagonal vein.

This is what has been termed during the trial as the blue vein. This Prof. Shaler found to be a huge brecciated vein, full of fragments of granite, with fragments of the Anaconda and Colusa-Parrot veins. Continuing his description of this blue vein he said: "I found that those fragments were in many cases shaken by violent strain; in many cases they have been rounded and bruised—in other words, this part of the vein was the seat of great violence. I found that from the granite walls the vein fragments, evidently separated by vertical fissures, had settled down into the cavity of the fracture. The walls were heavily grooved in more than one direction, showing divers motions on the planes of this vein. I found, further, whenever I struck this vein or came up to it in a crosscut or drift, or any intersecting gallery or shaft, a set of peculiar conditions. Going along with my candle I could see I was coming to this blue vein 50 or 100 feet off by the quality of the clay which had tumbled out on the floor, the clay being often piled 2 or 3 feet high."

A matter of some interest he found in several places was that he could hear the actual gurgling of water through the vein from above; the vein was a place of very free downward passage of water, unlike the fact existing in other veins. But the most striking feature to him was the large amount of clay. While clay is also found in places on the foot wall of the Anaconda, for persistent occurrence it is far more common in the blue vein. He was satisfied that this was a fissure vein, representing a great rent.

He felt certain that the blue fissure is a continuation of the same one that crosses the mountains, the variation in line not exceeding 4° or 5°. "I would say that this extension of that fissure," said he, "has been evidently remarked by miners; they have seen that something was there, as a set of test pits have been run along the line, none of them profitable. They have seen, however, that there was something there to inquire into long before I had a chance to." Another reason why he believed it was the same fissure is because their width is approximately the same.

He said he had never seen a fault of this sort that did not have a great many spurs and parallel fissures. "You couldn't apply a strain of rock such as this was," said he, "when the strain was applied, full of joints and small veins, lines of weakness, without causing a great many local accidents.

"As to the filling of this blue or diagonal vein, for the most part," he said, "it consists of great slivers of the granite country rock. They reminded him of those great obelisk-like fragments which are found in the mountain notch referred to, where they stand up sometimes 100 feet, slender, column-like, flaky masses, that seem to have settled down into this opening. They are broken a good deal, the motion of the fault having ground them up more or less."

The clay he considered singular and characteristic, and has filled every place. Then here and there ore has been formed, apparently by the replacement of the rocks in the vein, though some of the ore in the vein, he said, has undoubtedly come from the breaking up at the intersected sections or ends of the once united Colusa and Anaconda veins.

THERE are fifty works in Russia where sulphuric acid is made. The importation of sulphuric acid was 36,000 poods (590 metric tons) in 1898, as against 10,000 poods in 1897. At St. Petersburg and in the western department sulphuric acid is made from pyrites imported from Scandinavia. Iron pyrites is subject to an import duty of 1 copek per pood. Iron pyrites containing over 2% of copper pay a duty of 2.75 copeks per pood for every unit over 2%. In 1898 the imports of pyrites amounted to 2,509,000 poods, all being of the class containing less than 2% copper.

Treatment of Copper Mattes in the Bessemer Converter.*

In reviewing the progress of the art in America, a description of the various members of the plant properly precedes any description of the process. There can be no doubt that the elevation of the tuyeres, whereby they were raised above the level of the first formed copper, and rendered readily accessible by a properly constructed wind box to permit of systematic punching, constituted the modification which led up to the ultimate success of the method. Though side tuyeres on the level of the bottom were inserted in some of the earlier forms of both fixed and movable converters, and elevated tuyeres had been used in the Darfee converter as early as 1864, and were at the very time of M. Manhes' investigations the subject of experiments in the Clapp–Griffith converter, nevertheless M. Manhes was probably led up independently to their adoption by the failure of all his predecessors to carry the concentration beyond the white metal stage on account of the chilling of the copper in the vertical bottom tuyeres.

The converters first designed by M. Manhes for the Parrot works were small, of the vertical type, with elevated tuyeres, but deficient in appliances for readily reaching the tuyere through the wind box for the purpose of punching.

In the next works, namely, the experimental plant of the Anaconda Co., provided with twelve stands and four remelting furnaces, the converters were also stationary, and were revolved by gearing worked by belts and pulleys. They were, therefore, relined in place. When this was found to be wasteful the converters were removed on carriages after the shell had been uncoupled at the trunnions from the air pipe. The raising and lowering of the converter was effected by jackscrews. In these early works three converters were coupled up with each remelter, and relining was done in place after the exhausted lining had been cooled down by drenching it with water. When working with high-grade mattes three shells in commission to one in active service necessitated three stands being in position, which would involve for a large output works of ungainly size. The plan of relining in place has, therefore, been everywhere abandoned. During these initial stages of the art Mr. Stalmann erected and ran for a time a Bessemer plant at Durango, Colo., on rich argentiferous ores and mattes, in part the by-product of lead furnaces. The losses in silver were heavy, owing to the presence of lead, and therefore the method was abandoned. He used the square converter with square body and trough-shaped bottom that goes by his name.

In the next large establishment started, that of the Boston & Montana Copper Co. at Great Falls, the melting furnaces, which were at that time tilting reverberatories, were ranged on one side of a central aisle and the converters on the other. An electric crane, traveling to and fro over and beyond the central aisle, transferred by ladle the matte from any of the furnaces to any of the converters, and carried the shells back and forward between the stands and the relining room. The tilting furnaces have since been abandoned for stationary regenerator reverberatory furnaces of large size and capable of smelting roasted ore into matte at the rate of from 125 to 150 tons per day. At the same works cupola furnaces of 300 tons capacity are in operation, which reduce first-class lump ore and coarse concentrates without roasting to a grade proper for converting. From these, as well as from the reverberatories, the matte is transferred, while still fused, to the converters, and remelting is saved. The six converters are modeled in all details after 15-ton steel converters, but are provided with elevated instead of bottom tuyeres. Though very much larger than the converters used in any other works, the charge blown is not greatly in excess of the normal, the increased size permitting of much thicker lining than is usually being employed. The converters have always been tilted by hydraulic pistons operating a rack and pinion, a method now everywhere adopted.

Much larger works are those of the Anaconda Co. at Anaconda, where fifteen converter stands have been erected, though twelve only generally carry active shells. The converter building could not be placed in sufficiently close proximity to either the lower or the upper smelting works to avoid the interposition of remelting cupolas. On one side of the large converting building the remelting furnaces stand on a platform above the level of the converters, one remelter to two stands. Both cupolas and converters can thus discharge their gases into the same large flue. On the other side of the wide aisle through which the electric crane travels with the empty shells and the slag pots are several tilting copper refineries, into which the ladle, handled by the electric crane, pours the copper delivered from the converters. In these furnaces copper is sufficiently refined to make smooth anodes for the electrolytic tanks. These tilting reverberatories differ little in shape or design from Bruckner's calciners. The first was, in fact, a Bruckner shell. An opening in front of the cylinder is made sufficiently large to admit the pole and rabble. The charge is poured from a door on the side into a ladle of sufficient size to hold copper for an anode, and is then transferred from this ladle to an anode mould, the whole operation being effected by mechanical appliances and the exact quantity per anode being thus secured.

The hood and horizontal flue with pocket for carrying off the gases and dust from the converters perform their work perfectly, and permit of the easy separation and removal of the crusts which form in the hood.

But before the starting of the new Anaconda plant the Montana Ore Purchasing Co., a corporation which, under the energetic management of the Messrs. Heinze, has grown from a mere sampling and purchasing mill into a large mining and metallurgical concern, had erected a converting plant with two stands, the shells being of the Parrot pattern, but moved on cars. They still use this type of shell, but have replaced the cars by a hydraulic crane.

These are the only Butte works provided with converting departments in operation, but the Butte & Boston Co. is now erecting a plant of two stands. It has decided to adopt the horizontal trough converter, or, as they call it, the "barrel" converter.

The Copper Queen management has investigated the trough or barrel type of converter at the works of the Societe Metallurgica d'Italia, Leghorn. Here small converters of this design, tilted by hand and capable of blowing up about 30 cwt. of copper from 33% matte tapped directly from the cupola, were seen to be making copper under a very low blast, and this type of shell recommended itself on that account as more economical than the vertical. The converters as designed by the Copper Queen Co. by Messrs. Fraser & Chalmers on the same lines were estimated to be capable of holding on an average five tons of matte. They proved to be so efficient and economical that their adoption was followed in the three other Arizona works which have applied the pneumatic method, and, as already stated, one of the Butte works has decided to use them in preference to the vertical converter. The argument in favor of the trough or barrel converter is that the metal covers in a thinner layer a larger area, and therefore there is never the same depth of metal to be blown as in the vertical converter. Moreover, when copper has been formed the converter can be tilted, as the tuyeres are on the same level and on one side only, and thus the air is driven only through the residual matte, and, therefore, not necessarily through copper already reduced to the metallic state. The trough converter as used at the Copper Queen, the Arizona Copper Co. and the Detroit Copper Co. are 8 feet in length by 5 feet 8 inches in diameter. They rest and are revolved on runners, and the blast is carried into the wind box through a pipe with detachable joints which occupies the position of a trunnion in the vertical converter. The cover is made as flat as seemed consistent with safety in lining, and the mouth projects straight from the center of the shell—a somewhat objectionable feature, as it involves blowing vertically instead of laterally into the hood, a structural detail, however, which can be remedied to suit each converterman's views. The trough converter, being so much longer and lower than the vertical or cupola converter, adapts itself more safely to removal on a car than the vertical form. The Queen and Detroit companies have been using a car provided with a hydraulic plunger, on which the shells can be rapidly raised or lowered.

(TO BE CONTINUED.)

*Condensed from a paper read by JAMES DOUGLAS before the London Institution Mining and Metallurgy.

How to Make a Cheap Clinometer.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER, California State Mineralogist.

Cut out the protractor in Fig. 2; paste it on a board as shown in figure. Attach a silk thread at the point B. Then attach a lead ball A to the lower end of the thread so that the thread and ball will swing like a plummet. Hold the upper edge of the board parallel with the plane of bedding of the strata under examination and the plummet line will bisect the circumference of the protractor and give the degrees at which the formation dips from the horizontal.

After the dip of an oil sand is ascertained by a clinometer the following table will show at what depth the sand should be reached by drilling a well a known distance from the outcrop of the sand.

For instance, as shown in Fig. 1, A is an outcrop of a bituminized bed. The clinometer shows that this bituminized bed dips 40° from horizontality. For 100 feet horizontal (A C) 40° will give a vertical distance (C D) of 83.41 feet. The slope of the ground (A D) is 5° from horizontality. By looking at the table 5° will give a vertical distance (C B) of 8.75 feet to 100 feet horizontal. Deduct this vertical distance (C B) from the vertical distance (C D) as follows: 83.41—8.75= 74.66 feet. Consequently a well 74.66 feet in depth will have to be drilled at B in order to reach the oil sand (A D). The following table shows the vertical distance for each degree of dip from horizontality, for a horizontal distance of 100 feet.

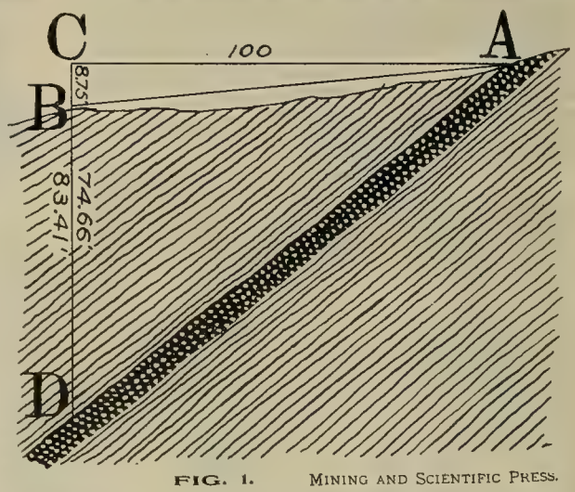
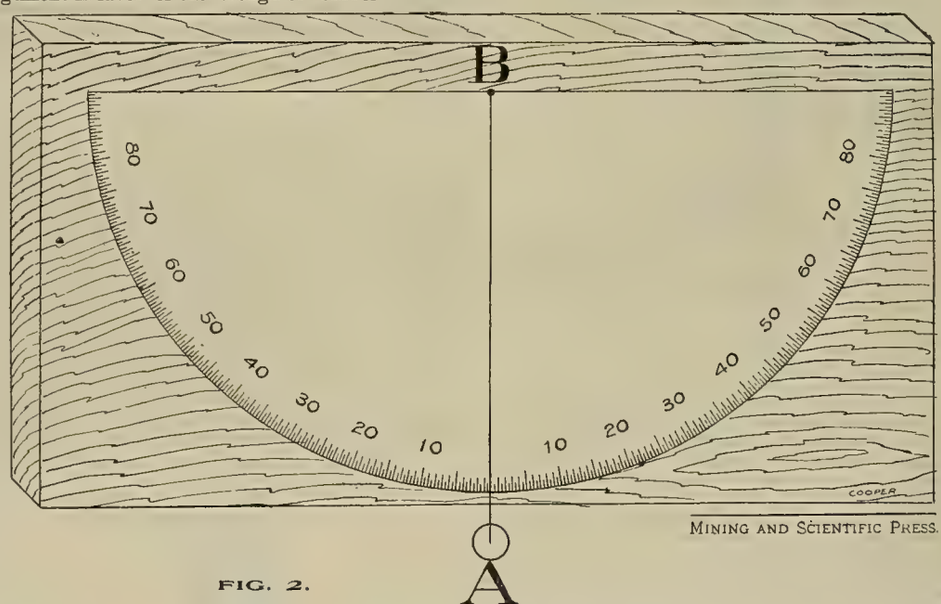


FIG. 1. MINING AND SCIENTIFIC PRESS.



MINING AND SCIENTIFIC PRESS.

FIG. 2.

Deg.		Deg.		Deg.		Deg.	
1	1.75	24	44.52	46	103.55	68	247.50
2	3.49	25	46.63	47	107.23	69	260.50
3	5.24	26	48.77	48	111.06	70	274.74
4	6.99	27	50.95	49	115.03	71	290.42
5	8.75	28	53.17	50	119.17	72	307.76
6	10.51	29	55.43	51	123.48	73	327.80
7	12.28	30	57.74	52	127.99	74	348.74
8	14.05	31	60.09	53	132.70	75	373.20
9	15.84	32	62.49	54	137.63	76	401.07
10	17.63	33	64.94	55	142.81	77	433.14
11	19.44	34	67.45	56	148.25	78	470.46
12	21.20	35	70.02	57	153.98	79	514.45
13	23.09	36	72.65	58	160.03	80	567.12
14	24.93	37	75.36	59	166.42	81	631.37
15	26.97	38	78.13	60	173.20	82	711.53
16	28.67	39	80.98	61	180.40	83	814.43
17	30.57	40	83.91	62	188.07	84	951.43
18	32.49	41	86.93	63	196.26	85	1143.00
19	34.43	42	90.04	64	205.03	86	1430.06
20	36.40	43	93.25	65	214.45	87	1908.11
21	38.39	44	96.57	66	224.60	88	2863.62
22	40.40	45	100.00	67	235.58	89	5728.99
23	42.45						

MINING SUMMARY.

ALASKA.

A. Nevins, Supt. Alaska-Juneau mine, at the head of Silver Bow basin, has gone up with fifty men to start work.

Charles D. Lane, the California millionaire mine owner, is preparing to engage in Cape Nome sluicing on a large scale. He is finishing six barges at San Francisco, each of which will have a donkey engine and centrifugal pumps on opposite ends, to be used to wash rich earth. A sternwheel tug is being fitted out, all to be taken north on the steamer Charles D. Lane, formerly the Irrawaddy.

The Chilkoot Tunnel Co. say they have assurances that next month the British Columbian Parliament will grant a permit to begin work on boring a hole through the huge mountain in Alaska after which the company is named, and that there will be no difficulty in obtaining a franchise from the Canadian Government for the proposed railroad to White Horse rapids.

The Treadwell mine on Douglas island is to be further enlarged this year. Preparations are in progress for the addition of 240 stamps, increasing the total capacity to 1120. The enlargement involves an expenditure of $750,000. The Treadwell has now 880 stamps in operation. The framework is in course of construction at Seattle, Wash., in charge of A. Mackay, constructing engineer of the Treadwell. He says he hopes to have this portion of the work completed by May 15th and that the stamp mill addition would probably be on the ground and in operation by November 1st. One million feet of lumber is being used in the construction of the framework, to be shipped north on the steamers Al-Ki and Santa Cruz.

C. W. Brandon left Nome City Jan. 14th with H. L. Blake, went from Nome direct to Nushigak—1000 miles—by dog team, from there to Kadiak by boat, thence southward on the steamer Bertha. He says the claims on Glacier, Anvil, Snow, Dexter and Buster creeks are the richest there. He says there is no question about the richness of the country, "but as far as that is concerned everything has been staked out within miles of Nome. I do not see how the vast number of people who are contemplating going there can find claims unless they buy out some cheap ones, for the owners of the claims that are paying well will not sell at any price, or else strike back into the interior, and that takes a whole lot of nerve. There were six new districts located this winter between Nome and St. Michael. They have not been prospected as yet, being merely staked out on the snow. Everyone is wild there over every rumor of a strike that reaches camp. When I left," he continued, "nearly everybody was stampeding to the Norton Sound country, where a rumor locates a bonanza strike on Christmas creek."

Mr. Brandon brought out over 500 letters with him from Nome citizens and a number of options on claims located at Nome. He is of the opinion that the camp is good for five years yet. He has been at Nome since November, 1898. He was the twenty-fifth man there, and said that it seemed to him that the claims were nearly all located then. "No," he said, "the people who go to Nome this spring will experience all kinds of trouble in getting claims,"

ARIZONA.

GILA COUNTY.

The Black Warrior smelter near Globe has resumed.

T. C. Stallo has about ten pounds of turquoise from the mines of Stallo & Olcovich, eight miles west of Globe. He has shipped ninety pounds of turquoise to his partner, B. Olcovich of San Francisco.

PINAL COUNTY.

The concentrating mill of the Ray Co. will start up May 25th. It is a complete plant, with twenty concentrating tables and power for as many more. The railroad between the mines and mill—six miles—is finished and daily trains are running.

YUMA COUNTY.

The Crosby-Ehrich syndicate of Colorado Springs, Colo., will put three dredges this season in the Potholes country. The dredges are now building at Yuma. Each dredge will cost $50,000, taking 110 tons machinery.

The Papago Copper Co., headquarters in Los Angeles, will develop its group of gold, silver and copper mines in the Mohawk mountains, 40 miles southeast of Texas hill.

Mgr. Luce has started his new concentrating plant at the Castle Dome lead mines.

YAVAPAI COUNTY.

The Congress mine workings are now 2525 feet deep. For two years the company has been operating a 100-ton cyaniding plant, at which only the roasting process is employed, a necessity owing to the character of the tailings deposit. The tailings have paid $5 a ton. The company operates a standard gauge 3-mile line of railway from Congress Junction, on the S. F. P. & P. to the mines. Four hundred men are on the pay roll.

At the Iron King on Decatur hill, near Jerome, W. A. Clark is still driving a tunnel to tap the Equator ledge.

The Gold Reef, East Gold Reef and Midgeon mining claims are bonded to Dr. Hendricks of Los Angeles for $100,000. A cash payment of $5000 was made.

CALIFORNIA.

ALAMEDA COUNTY.

The Yuba Electric Power Co. has applied for franchise to run lines through the county for transmission of electricity for power and lighting. The Yuba Co.'s power plant is on the North Fork of the Yuba river, near Dobbins.

AMADOR COUNTY.

At the Peerless mine, the Dispatch learns that the shaft is 210 feet deep, and is in ribbon quartz its whole width.

CALAVERAS COUNTY.

The tunnel at the Melones mine, Robinson Ferry, is in 2750 feet. When in 4300 feet it is calculated the ledge will be encountered.

The winze in the lower level of the Lockwood mine at West Point will be put down to a depth of 750 feet.

Citizen: The Lightner M. Co. at Angels has put in a 1000-foot wire cable and two 1200-pound sheaves.——The Green Mountain hydraulic mine near Mokelumne Hill is working with a full head of water. ——The mill run of the rock from the Commodore mine averaged $4 per ton.—— H. McSorley has a double shift working at the Camanche Co.'s mine near Camanche.

EL DORADO COUNTY.

S. R. Porter and others of Amador county have a bond on the Church mine, Mud Springs district, and will unwater and develop the property.

The Nugget says the pocket miners on the Georgetown divide are meeting with success. Over $50,000 was taken out during April, divided among several miners.

C. H. Dunton is again in charge as Supt. at the Larkin mine.

FRESNO COUNTY.

(Special Correspondence).—An interesting piece of work in placer mining is under way by the C. & S. Co. on the San Joaquin river at Millerton—the old county seat of Fresno. A. Cleghorn, the Supt., intends to turn the river by a 750-foot center and 200 head and foot walls. A water-wheel will be used to drain. About 400 feet of the center wall is complete. A complete prospect of the bed will be made by July 1st.

Coalinga, May 4.

The Kings County Oil Co. is going to bore a new well close to its old one, No. 1, in the Kreyenhagen district. Wm. Chatham, Supt. for the company, is in San Francisco for a new drilling outfit.

The California Rock Oil Co., which controls 120 acres of land in Oil City, is erecting derricks and preparing to bore two wells.

KERN COUNTY.

The Kern Oil Co. will have a spur built from the Southern Pacific branch line for loading cars near its wells.

The Brown Co.'s well on 27, 28, 29 is 1100 feet deep. The drill is in brown shale.

LOS ANGELES COUNTY.

Six miles east of Newhall the Pioneer White Oil Co. is going down 1000 feet.

MADERA COUNTY.

The strike in Grub Gulch by C. M. Ward continues to show as much gold as at first.

NEVADA COUNTY.

The Grass Valley Standard G. M. Co. has incorporated by S. A. White, T. F. McAvoy, J. J. McCormick, H. J. Thomas, J. Henan; capital stock $50,000.

The Beebe G. M. Co. has also incorporated. The directors are J. J. Blackburn, J. H. Coughlin, J. Hayes, W. H. and M. H. Weldon; capital stock $25,000.

The Home mine will soon build a 20-stamp mill on the property. D. McFall will have charge.

Japanese were imported to displace white men at the Poorman & Hastings mine, on the Middle Yuba river, 15 miles from Grass Valley, but the owners sent them back to San Francisco.

ORANGE COUNTY.

Drilling in the Soquel canyon is in progress; the well is down 450 feet.

The Union Oil Co. is now pumping, it is understood, at the rate of 100 barrels a day from a well which is only in the first oil sand.

PLUMAS COUNTY.

C. E. Ertz, who has charge of the Halstead mining property on the East Branch, will put in a sawmill and a 20-stamp quartz mill.

A quartz mill is being put up in Light's canyon for the Diamond M. Co.

SAN BERNARDINO COUNTY.

(Special Correspondence).—A group of gold quartz veins is being developed 7 miles south of Ludlow, a station on the A. & P.—the Bagdad—owned by Woodard, Suter & Co. Porphyry constitutes the country rock; the pay ore is 12 feet wide. W. R. Woodard of Randsburg is Mgr. and Cyrus Grant resident Supt.

One-half mile from the Bagdad, J. R. Gentry made a location last fall which has since produced considerable amounts. Five sacks of the ore shipped is reported to have netted $1300.

Green & Co. have bought several claims near the Gentry, employing a number of men opening the property.

San Bernardino, May 8.

Needles Eye: The mill being erected by T. Ewing, about 42 miles up the river, will be completed soon. It has a 20-stamp mill, and, with the one of like proportions a few miles farther up on the other side of the stream, will handle all the ore in that district.

SANTA BARBARA COUNTY.

There has been an assessment of $5 per share on the stock of the American Asphalt Co., or the Alcatraz Paving Co.'s branch of it. The latter is credited with being one of the very few concerns that ever beat the Southern Pacific Co. at its own game. It is the well-known policy of the S. P. Co. to put on "all the traffic will bear" and charge as much freight as it thinks will just save the producer from ceasing to produce. When the Alcatraz Company started to mine its asphalt deposit, 40 miles from the Santa Barbara sea coast line, the S. P. Co.'s branch road assumed that everything was coming its way, but the Alcatraz people built a refinery at the mine, put in a double pipe line to the coast, dissolved the asphaltum in naphtha, let it run by gravity down to the coast and pumped the naphtha back to the mine, the whole thing being conducted at a moderate cost independent of the railroad company. It is so seldom any California mining or manufacturing business escapes from the enforced necessity of paying tribute to the Southern Pacific that the occurrence is considered worthy of mention.

The well of the Southern Pacific Co. at Summerland, which at first produced about 100 barrels per day, has settled down to about twenty barrels.

SISKIYOU COUNTY.

Journal: The Yreka M. Co., working the Gold Ball or Klamath mine at Salmon river, is running a 20-stamp mill, with abundance of ore.——Fifty men are building a road from the Gazelle and Callahans road to the Dewey mine, west of Gazelle.

TUOLUMNE COUNTY.

The Arrastraville M. Co. has levied an assessment of 10 cents per share.

Democrat: The Arbona, Tuttletown, 10-stamp mill is in constant operation.—— The Mt. Zion mine, near Groveland, is to be bonded.——The Kanaka mine and mill now employ twenty-five men. —— The Horseshoe Bend property, on the Stanislaus river, is to be sold to Eastern men for $15,000.——At the Ferguson mine the tunnel has a total length of 1500 feet. The fine slate which was originally cut through in the old tunnel for the first thousand feet, is coming in again. The vein is 2½ feet in width, with a 12-inch streak of high-grade ore.——The Soulsby mine at Soulsbyville may soon be in operation. J. G. Hopper goes to Paris to submit facts and figures concerning it. The Soulsby covers 130 acres of ground.

VENTURA COUNTY.

The first prospect well put down near Rincon Point by J. W. Churchill, has reached a depth of 780 feet.

COLORADO.

BOULDER COUNTY.

Ward Miner: The Cold Spring M. Co. will put up a 100-stamp mill on Left Hand creek, near the mouth of their tunnel. J. M. Page is Mgr.

EAGLE COUNTY.

The Herald-Democrat says that the Newhouse tunnel, being driven into Battle mountain near Red Cliff, is now in 700 feet and is already draining the principal mines of that section. With air drills the men are cutting into the hill at the rate of 140 feet per month. Eventually the tunnel will penetrate the lime contact at 3000 feet in from its mouth and will then have a vertical depth of 1800 feet, tapping the contact on the dip. It is designed to reach and afford facilities for the drainage and development of 680 acres of ground controlled by the Newhouse syndicate. At the present rate of progress this object will be attained in about eighteen months. Its completion will be a great thing for the Eagle river country.

FREMONT COUNTY.

The National G. E. Co.'s plant at Florence has a daily capacity of 200 tons, being enlarged from a capacity of seventy-five tons, at an expense of $130,000.

Upon the erection of the new smelter at Colorado City the combined capacity of the plants managed by Tutt, Penrose & McNeill will be nearly 1000 tons per day, the Colorado - Philadelphia Reduction Works at Colorado City having a capacity of 350 tons, the plant at Florence 200 tons, and the new Standard M. & S. plant about 400 tons.

GILPIN COUNTY.

At the new mill being erected by the Boston & Denver M. & M. Co. at Black Hawk the eighty stamps will weigh 1000 pounds each. The mill will be running July 1.

The Avon 25-stamp mill on North Clear creek is running.

GUNNISON COUNTY.

H. S. Roe, Mgr. Cortland Co., is shipping three carloads of ore a month to the Pueblo smelters. The ore runs $100 a ton in gold and silver. Twelve men are at work on the main workings and contracts are in progress in various parts of the property.

The Calumet Co. is working a rich ore shoot and will soon commence shipping ore.

Near Ohio City, Gold Brick district, a vein of silver ore is being opened in the Magnet mine, carrying ruby, wire and leaf silver, with arsenical blendes carrying gold and galena.

LAKE COUNTY.

At Leadville the Revenue M. Co.'s shaft No. 1 at Rock hill is down over 550 feet and is in gray porphyry.

Miner: The Resurrection mine ships over the Klondike branch of the Denver & Rio Grande 200 tons per day. The new three-compartment shaft is down 400 feet. It will be sunk 1000 feet, 300 feet below the present workings. —— At the Iron Mask large bodies of sulphide ore have been opened in the lower workings and the values show increase in copper, returns giving 15%.

PITKIN COUNTY.

At Aspen, after being snowed in for three months, the Upper Durant and Tourtelotte Park mines have resumed shipments.

SAGUACHE COUNTY.

The San Isabel M. & M. Co., at San Isabel, 3 miles from Crestone, are putting up buildings and will build a $75,000 mill this summer.

SAN JUAN COUNTY.

In the Terry mill, near Silverton, the rolls are to be replaced by stamps. The capacity of the mill is seventy-five tons a day, and thirty stamps will be required.

SAN MIGUEL COUNTY.

Near Telluride the new 60-stamp mill of the Smuggler-Union M. Co. is in operation. There is a 4½-inch drop, ninety drops to the minute.

This week the Liberty Bell 40-stamp mill resumed, the cyanide plant below it now being finished.

TELLER COUNTY.

Last week J. F. Burns, Pres. Portland G. M. Co., issued orders to again resume work with a full force.

The Lucky Gus mine is reported sold to W. S. Stratton for $300,000.

The recent advance in the price paid for gold by the smelters to $20 an ounce affects all contracts, large or small shipments.

Post: As predicted, the output of Cripple Creek for the disastrous month of April was about one-third less than it was in the month of March. The extraordinary weather did it. The contest over treatment and railway charges may have had slight influence, but if so it is not enumerated. Snow storms began soon after the first of the month and there was little intermission between tempests to the very last day. Surface water deluged the mines, wagon roads were rendered impassable, railroads seriously impeded, and a shortage of production resulted. The chemical mills received 24,000 tons of ore, from which they extracted $665,000 gold. The different smelters received 10,000 tons of an average value of $75 a ton. The smaller reduction plants extracted $18,000 worth of gold; total value for the month, $1,433,000. The mill ore averaged $27.70 a ton. This is a remarkable exhibit if wholly correct. Consider the averages —$75 a ton for smelting grade and $27.50 for the milling product; it is without parallel in the world. Until Cripple Creek came in it has been unequaled in the annals of our State. If the weather during May shall be favorable the largest output of the current year will follow. All the ore bins at the producing mines are full and thousands of tons of high and low grade are broken and ready for hoisting when the decks shall have been cleared. It is reported that increased forces will

be placed in the Portland and the Isabella.

IDAHO.

Boise Statesman: J. W. Cunningham, Supt. U. S. Assay Office, has completed his report of the Idaho output of gold, silver and lead for 1899. It shows: Gold, $2,110,718; silver, $5,283,443; lead, $4,713,604; total, $12,107,765. The subjoined table shows the output of gold and silver by counties for 1899:

Counties.	Gold.	Silver.	Total.
Ada .....$	18,543	$ 336	$ 18,879
Bannock.	15,876	138	16,014
Bingham.	19,452	199	19,631
Blaine...	31,090	229,953	261,043
Boise....	393,902	7,345	401,247
Canyon..	10,873	113	10,986
Cassia....	18,088	88	18,176
Custer...	63,649	231,208	295,557
Elmore...	70,470	2,566	73,036
Idaho....	166,367	3,667	170,034
Lemhi...	359,876	4,591	364,467
Lincoln..	33,302	194	33,496
Oneida...	15,504	136	15,640
Owyhee..	702,863	1,262,955	1,965,818
Shoshone	177,819	3,539,029	3,716,846
Wash'ton	13,044	225	13,269
Totals..$2,110,718		$5,293,443	$7,394,161
Gold, fine ozs.....	102,106		$ 2,110,718
Silver, fine ozs....	4,086,413		5,283,443*
Lead, lbs.....104,746,768			4,713,604
Total.....$12,107,765			

*Coinage value.

ADA COUNTY.

Telluride is reported discovered by the Idaho M. & D. Co. 4 miles north of Boise.

LATAH COUNTY.

A large mica mine is on Mica mountain, 35 miles east of Moscow. A. Munro, Mgr. of a group of these mines, is credited with the statement that upon this mountain there is enough mica to supply the United States for twenty years. One sheet recently taken out, he says, weighed 100 pounds.

OWYHEE COUNTY.

Avalanche: The Dernier Resort M. Co. will operate three claims on War Eagle mountain, near Silver City.

SHOSHONE COUNTY.

A 100-drill air compressor will be put in by the Morning Co. at the mouth of Grouse creek, below Mullan, to be run by water. The tunnel from mill to mine will be 1½ miles long.

MICHIGAN.

News Bureau: Calumet & Hecla is opening a mammoth mine on the Osceola lode. They are now running seventy power drills in the five amygdaloid shafts, which is a larger number than is employed on any other mine of the district. There is a scarcity of first-class miners throughout Lake Superior copper and iron districts. Supply of second-class miners, trammers and rough labor is adequate to any probable demand for some time to come. Finlanders are coming to mines by shiploads. Five emigrant cars, packed to limit, reached Upper Peninsula last Thursday.

HOUGHTON COUNTY.

The Calumet & Hecla is expected to produce 100,000,000 pounds of copper this year.

The Osceola Co. produces about 12,000,000 pounds of copper annually.

The Quincy M. Co.'s output this year is estimated at 15,000,000 pounds.

The Tamarack M. Co. produces about 22,000,000 pounds of copper annually.

MONTANA.

FERGUS COUNTY.

E. W. King is general manager of the Great Northern Mining & Development Co. at Gilt Edge. The cyanide mill has a total length of 300 feet and is lighted by 100 lights. There is an ore driver 28 feet long. The ore from the mine is dumped into a large ore bin and carried by a conveyor from this bin to the crusher. One may regulate the ore from the bin to the crusher and after the ore passes through the crusher it is carried by an elevator to a dryer and then lifted to a large screen in the top of the mill, and what does not go through the screen goes into a set of rollers, crushed and lifted again. On the second floor there are six seventy-ton tanks each 28 feet in diameter and 3 feet deep. Two of these are emptied and filled each day, making an average sum of 140 tons daily. A two-ton car is used in filling the tanks, so arranged that by the use of liners that the car is filled, run out over the tanks, dumped, and run back, being carried on an endless rope. One man fills a seventy-ton tank in less than one hour. There are two solution tanks 12 feet in diameter and 5 feet deep; two settling tanks 14x4 feet and one dump tank 15x5 feet. There is an automatic regulator to the circulating pump and if the solution gets too low it will raise steam and if too high will shut it off. In the engine room there are six rows of boxes, eight compartments in each box. These compartments are all filled with zinc shavings and every morning the shavings are moved to the next box ahead, the principal part of the gold caught in the first two or three.

FLATHEAD COUNTY.

At Libby, the Snowshoe concentrator has started. The tunnel is now less than a thousand feet from the other side of the mountain, being 1800 feet in. The Snowshoe mine has an eleven-drill air compressor. Libby is the headquarters of the Pacific Northwest M. Co.; H. E. West, Gen. Mgr.

The West Fisher M. Co. has started its 10-stamp mill on the West Fisher and it will be kept running all summer. Mgr. Murphy has hopes of being able to keep it going through the winter months. When in operation the mill and mine will afford employment for thirty-five men.

MADISON COUNTY.

At Pony, the Old Joe mine is sold to W. W. Morris for $15,000; $3000 down, balance in two equal installments.

MISSOULA COUNTY.

Another strike is reported in the tunnel of the Granite mine. Two feet of the ledge runs $100 a ton in gold.

Messrs. Tebbets of Spokane and Porter of Helena have bonded in the Wallace district a group including the Bullion, Cape Nome, Boston, Moose, New Queen and a half interest in the Empire, Union Eagle and Sleeping Child, for $100,000. It is understood that Messrs. Tebbets and Porter have closed another deal for the remaining half interest and they will at once proceed with the development of the claims.

SILVER BOW COUNTY.

The Pacific Slope M. Co. have decided to drift both ways on the lead, tapped at a depth of 200 feet by a tunnel 367 feet long.

The Anaconda Co. is locally credited with annually producing 120,000,000 pounds of copper.

The Boston & Montana Co.'s output is estimated at 75,000,000 pounds per annum.

The Parrot's output is estimated at 24,000,000 pounds annually.

The Colusa-Parrot and Anaconda mining companies have agreed upon a compromise order of the U. S. court relative to the operation of that portion of the ground involved in the lawsuit which has just been tried before Judge Knowles. By the terms of the agreement both parties are allowed to do certain work for the purpose of ascertaining more fully the truth or falsity of the allegations made in the course of the trial.

The order is in effect that upon the complaint giving security by bond in the sum of $50,000, conditioned that in case said temporary injunction shall issue, enjoining the defendants from the acts mentioned in the bill of complaint, that said complainant will pay to the said defendant so enjoined such damages not exceeding $50,000 as the said defendant may sustain by reason of the said temporary injunction in the event that it shall be finally decided that complainant was not entitled thereto; a writ of injunction issue restraining the defendants from mining in or upon what is known as and called the north or No. 1 Colusa-Parrot vein, in its descent into the earth and beyond the side lines of the Colusa-Parrot claim.

Provided, however, and it is ordered that notwithstanding the foregoing the defendant shall be allowed to make from the 600-foot level upon the vein in question one or two raises to the surface, said raises not to exceed two stope sets in size and shall also be allowed to crosscut or drift over to the workings of said vein now in existence or that may be made under the provisions hereof from the defendant's other workings; without, however, removing any more ore than may be necessary for the purpose of making connection or driving its workings to the vein, such drifting and crosscuting to be done only on levels; and that defendant may also run on said vein drifts or levels corresponding in elevation to the 200, 300, 400, 500, 600, 700 and 800 levels respectively to the Never Sweat levels, such levels to be not more than ordinary size and the number of such drifts or levels to be limited to seven.

Provided further, that the plaintiff shall have the right to run at least three crosscuts from the 300, 400, 500, 600, 700 and 800 levels of the Colusa-Parrot mine to intersect the No. 1 vein and shall have the right to make no more than four raises from the lowest of said levels to the surface and also the privilege of extending drifts on the said vein, corresponding in elevation to the 400, 500, and 700 Colusa-Parrot levels or the levels of the Never Sweat mine which are nearest to the said Colusa-Parrot levels to the east and west lines of the said Colusa-Parrot claims projected, and shall have the privilege of sinking three winzes from the 800 to the 900 Never Sweat levels in said vein or making three raises in lieu of said winzes from the 900 to the 800 of the Never Sweat.

It is also ordered that either party has leave to hereafter present an application to the court for an order to do other and further development work in and upon the said vein or for the purpose of developing the same, and for any other proper modification of said injunction.

It is also ordered that each party shall keep a correct account of the amount and value of all the ore extracted in the doing of the said work.

NEVADA.

ELKO COUNTY.

The Baltimore group, 23 miles north of Elko, Merriam mining district, have been bonded to A. H. Tarbet of Salt Lake City on a basis of $49,000. The ore is a carbonate and silicate of copper.

ESMERALDA COUNTY.

Messrs. Sutherland and Elliott at Candelaria say that tests of the tailings are satisfactory. A plant will be put in.

The Vulcan Copper Co. at Siegelville has fifty miners at work drifting on the 200-foot level. As soon as the new hoisting works are completed the three-compartment shaft will be sunk several hundred feet deep. The ore averages 4% in copper, besides low values in gold and silver. The smelter is being reconstructed into a reverberatory furnace. The company owns the Columbus coal fields and has ten men at work developing the veins. There are six outcroppings of coal on the property. The coal will be used raw in the smelter.

The ore tailings at Belleville are said to contain $400,000 gold value.

LINCOLN COUNTY.

A tunnel to tap the ledge at a greater depth is to be run on the DeLamar.

STOREY COUNTY.

At a meeting of mining men interested in the Comstock properties in San Francisco this week were opened the bids for pumping out the mines that work might be resumed in the lower levels. Twenty-six of the mining companies were represented. The bids ranged from $75,000 to $227,000. The work to be accomplished was the pumping out of 600 feet of water from the mines and raising it so that it would run through the Sutro tunnel, making it possible for the mines to be worked for ten years in the lower levels. The bids were finally rejected. The meeting decided to arrange the surface machinery to be ready to start with electrical power when supplied.

WHITE PINE COUNTY.

Hamilton, famous in the days of the White Pine excitement, is shipping more lead ore than any other camp in the State, except Eureka.

NEW MEXICO.

GRANT COUNTY.

The Santa Rita Co. have completed their leacher at Santa Rita. It is composed of eight tanks; the process by which the ore is treated will allow the running of copper ore that only runs 3%. The process used in the leaching method of treating copper ore is by the use of acids. The ore is first crushed, then run into one of the large tanks and covered with sulphuric acid, which gathers up the copper in the ore; then it is run into another tank, and so on, finally being run onto iron for precipitation.

RIO ARRIBA COUNTY.

(Special Correspondence).—Near Espanola, on the Denver & Rio Grande Ry., the Chama river empties into the Rio Grande. On the Chama, about 25 miles above its mouth, are 1700 acres of placer grounds belonging to the Rio Arriba Placer M. Co., composed of Kansas City parties. These lands lie on both sides of the Chama and are about 8 miles above Abequiu, at about 6000 feet altitude. The stream flows, it is estimated, from 80,000 to 100,000 gallons of water per minute. It is claimed the banks and bars are rich in placer gold associated with and contained in the black sand, and the depth of the workable material is from 20 to 40 feet from the surface to bedrock. The gold particles are extremely fine and a sufficiently close saving cannot be made by the usual hydraulic methods. A dredger was built on the ground and it is stated another and larger one will be built. The company above named has leased 900 acres to the Rio Chama Gold & Copper Co., made up largely of St. Louis people, whose plans contemplate devices for concentrating the black sand and other firm material bearing the gold and putting up a smelter on the Chama to reduce the concentrates and extract the values.

Espanola, May 4.

SANTA FE COUNTY.

(Special Correspondence).—The Magdalena M. & S. Co., at Cerillos, started operations about thirty days ago, with Thos. Brown as president, R. B. Thomas general manager and L. S. Austin superintendent. It is smelting about fifty to sixty tons per day of ore. The principal tonnage comes from the Hardscrabble mine, near Magdalena, and consists of lead carbonates. The fluxing material, iron ore and lime, comes from the Glorietta mine, 28 miles from Cerillos. A small tonnage of high-grade gold, silver and lead ores is received from mines near Cerillos. Water and fuel are accessible, the Madrid coal mines being located 3 miles south of Cerillos. These coal mines, belonging to the Colorado Fuel & Iron Co., are at present closed down.

Cerillos, May 2.

SIERRA COUNTY.

(Special Correspondence).—The Black Range, trending north and south through Sierra county, is attracting much attention. There is more activity than usual in prospecting and developing. From Grafton northward the ores are silver and gold; from Grafton to Hagan's Reak they carry gold and silver, with the addition of copper. It is claimed the best ore runs about 1 ounce gold, 100 ounces silver and 5% to 20% copper; the workings are not to any great depth. The gold occurs in quartz in sulphide form; the silver is found in chlorides and sulphides; the copper in carbonates and bornites. Water and timber are abundant. The altitude ranges from 6000 to 6500 feet where the mines are located. Present development extends along the eastern slope of the range, 8 to 10 miles east of the summit. One mill is operating at Chloride and another at Grafton. Those properties best developed are the Ivanhoe, Braxton, Emporia, Wathena, Great Republic, Keystone, Gold Reserve, Eureka and Readjuster. Also, near Chloride are the Hoosier Boy, Nana and Arbothnot. The Grafton mill is being increased to a capacity of forty tons per day.

Active steps are being taken to secure the building of a railroad line from Magdalena to Chloride, Fairview, Grafton or other points in the Black Range foothills.

Embudo, May 4.

TAOS COUNTY.

(Special Correspondence).—The Copper Hill M. Co., of which J. K. Turner is manager, are developing a mine about 12 miles northeast of Embudo, having just completed a 60-ton concentrator. The ores are oxides and sulphides of copper, also carrying good values in gold and silver. They are putting in a water line, comprising 3 miles of ditch and 16,000 feet of iron pipe, through which a water supply is brought from the Rio Grande to the property. Metallic pipe was used for part of the line because a ditch through some of the porous ground would not hold water.

Chloride, May 3.

OREGON.

BAKER COUNTY.

The Red Boy M. Co., Granite district, proposes to sink a shaft 2000 feet.

GRANITE COUNTY.

The Blue Ribbon group, six miles from Granite, is bonded by G. Kislingbury and P. J. Donahoe.

UTAH.

BEAVER COUNTY.

Tribune: The Horn Silver, at Frisco, has marketed another lot of ore that showed 26% copper, fifteen ounces silver, 15% lead and $1 in gold per ton.

MILLARD COUNTY.

The Orizaba group, 10 miles from Black Rock, furnishes ore running 9% copper, in addition to small values in gold and silver.

SALT LAKE COUNTY.

The annual meeting of the Shawmut M. Co. of Bingham, Utah, will be held at Salt Lake City next Monday. Secretary Barnes says the company has in the Crown Point the longest shoot of ore and the highest grade in copper known to exist in the Bingham district. The vein shows ore assaying $4 gold, 2.6 ounces silver and 11.6% copper—$28.70 per ton. The U & I No. 2 tunnel is in about 600 feet and the vein has widened out to 47 feet. Cuba No. 2 tunnel with crosscut tunnel is now in about 1250 feet. Total number of feet of work done exceeds 4000, of which about 2500 feet are on the vein.

Tribune: A new scale of wages at the plants of the American Smelting & Refining Co. in Salt Lake valley went into effect on the 1st, an advance of about 12½%. The lowest wage paid under the new schedule is now $1.55 for eight hours' work, as compared with $1.40 under the old one. There are about 700 employes.

WASHINGTON.

FERRY COUNTY.

At the Golden Harvest mine, Supt. Gauthier is driving a tunnel 1000 feet on the vein; it is in 400 feet. Here a device

has been arranged to run a water wheel, which will be used to drive air into the tunnel.

At Republic, at the Mountain Lion mine, twenty men are employed, twenty stamps crushing eighty-five tons per day.

At Republic a steam hoist and pump will be put in by Mgr. Lilienthal on the Gold Ledge mine.

FOREIGN.

BRITISH COLUMBIA.

E. Mansfield, representing English and French capital, has bought the outstanding shares in the Joker mine at Camp Mansfield. The whole price of these shares was about $100,000.

Sandon, the second mining town of importance in the Slocan, was destroyed by fire on the 4th, and nearly all of its 1200 people are homeless and nearly ruined.

Vancouver reports that at Texada island Messrs. Prescott & Scott of the Union Iron Works are building wharves and installing a plant to work the iron mines on the island, which is midway between Vancouver and Victoria, and will ship the ore direct to San Francisco. The ore is said to go 68% iron.

Rossland reports for the week ending May 5 the amount of ore sent to the Northport smelter 3344 tons from the Le Roi.

Appended is a statement of the shipments for the past week and year to date: Le Roi, week, 3344 tons; year, 21,230.5 tons; War Eagle, year, 10,603 tons; Center Star, 7017.5 tons; Iron Mask, 1434.5 tons; Evening Star, 356 tons; Monte Cristo, 273 tons; I. X. L., 224.5 tons; Giant, 42 tons.

In the Slocan there are 300 men on the payroll of the Slocan Star, Payne and Last Chance.

The Minnesota Silver Co. will build a concentrator near Sandon this summer.

THE KLONDIKE.

A letter from Dawson, dated March 28, says: "Many claims are shutting down on account of inflowing water, and, unless it turns cold, many persons will be out of employment until it thaws enough to commence sluicing. The past two weeks the weather has been mild, and the snow having nearly disappeared, freighting on sleds is being done at night and early morning before the sun gets warm. Wagons are scarce and a good new one will easily bring $750 or $800. There are plenty of horses, 200 head having just been brought in. They were brought over the ice, drawing loads.

"The mountains are bare on the south slopes and much water is going to waste. It is estimated that the early thaw is doing $100,000 damage a day to this district. If too much water does not go to waste, this country will turn out more gold than it did last year.

"Many of the best claims on Bonanza, El Dorado and Gold hill are about worked out, but Dominion, Sulphur, Gold Run and others will make up the deficit. Sulphur, Dominion and Gold Run are not really in the Klondike district, but the road leads up the Klondike river there over the divide. Dawson is the supply point.

"Horse feed is scarce; it costs $3 per meal for a horse, while you can get a good meal for $1. We pay $22.50 for ninety pounds of hay, while rolled oats for our own use is but 20 cents per pound.

"We started a short time ago for Forty-mile post, with three horses and six sleds, leaving here at midnight. We expected to buy three tons of hay we knew was there and haul it to Dawson; but, when half way there, we found the trail so sliding and rough and liable to slough off into the open channel that we abandoned the enterprise. Returning, we boarded at Travelers' Rest Hotel for about a week at $6 per day for two. Then we bought a cabin near the government barracks.

"We do not know yet whether we will go to Nome. The steamboat company offers tickets to St. Michael on barge, in tow, for $50; on steamer, with stateroom, $100. In either case one boards himself or takes meals on the steamer at Dawson prices. Most of the boys will go in their own boats."

Dawson advices to April 12 give $18,000,000 as approximate estimate of the clean-up for the Klondike district this spring. A great part of the washing is being done with rockers, in consequence of the failure of the water supply for sluicing.

Catalogues Received.

PART III, Ericsson Series, is received. This series has a good deal of illustrated telephone information and pointers as to practice. The Ericsson Telephone Co., 296 Broadway, New York City, will send a copy of the series on request.

"RIEDLER PUMPS" form the subject of Catalogue No. 24, sixth edition, issued by Fraser & Chalmers, Chicago and London. This 200-page pamphlet, with rounded corners and linen binding, profusely illustrated and full of technical matter, is a good treatise on moderm pump manufacture and use, and the entire subject is splendidly presented.

Personal.

WM. BALL is the new Supt. Lower Mammoth mine, Eureka, Utah.

PROF. G. E. BAILEY is Supt. Adele M. Co., Lewiston, Trinity county, Cal.

ANDREW MAYBERRY is the new Gen. Supt. U. S. M. Co., Bingham, Utah.

E. W. KING is Gen. Mgr. Great Northern M. & D. Co., Gilt Edge, Montana.

JOS. DEDERICH has returned from Republic, Wash., to Salt Lake City, Utah.

D. B. HUNTLEY has returned to De Lamar, Idaho, from an extended Eastern visit.

FRED'K BUTLER succeeds J. H. Baker as Supt. Geyser-Marion mine, Mercur, Utah.

DR. CABELL WHITEHEAD, assayer of the Bureau of the Mint, has gone to Cape Nome.

H. A. COHEN, Gen. Mgr. for Capt. De Lamar, last week visited the Bully Hill mines at Sallee, Cal.

J. H. STRITE has gone from Redding, Cal., to Moffat, Saguache Co., Colo., to erect a 20-stamp mill.

R. C. CHAMBERS has returned from San Francisco to Park City, Utah, to resume work on the Daly-West.

THOS. HANNAHAN succeeds C. W. Betts in the superintendency of the Brownlow mine, Park Co., Colo.

WM. KIDDLE, formerly of Clifton, Ariz., is in charge of the Santa Rita Co.'s leaching plant at Santa Rita, New Mexico.

B. DELARAY, late Supt. Melones Co., Robinson's Ferry, Cal., goes from San Francisco on May 25th to Cape Nome.

PROF. APPLEBY of the University of Minnesota, is touring Colorado mines, accompanied by thirty of his students.

W. F. KANE, formerly Supt. Republic cyanide plant, Republic, Wash., is now Supt. Franklin G. M. & M. Co., Julian, Cal.

A. C. FLUMERFELT is the new Mgr. Granby M. & S. Co., operating in the Boundary and Kootenay countries, B. C.

T. H. OXNAM, Supt. Bully Hill mines, Sallee, Cal., has resigned and gone to Los Angeles to engage in mining business for himself.

DAVID KEITH of Utah was in San Francisco when he heard of the Scofield disaster, and promptly wired $1000 to the relief fund.

W. H. STORMS, State Mine Examiner, goes from Calaveras to Mariposa county next week, and thence to the northern part of the State.

HERBERT DEAKYNE, Capt. Corps of Engineers U. S. Debris Commission, has returned to San Francisco from an official visit to El Dorado Co., Cal.

W. B. DAVIS succeeds Supt. D. McFall as Supt. Texas mine, Nevada Co., Cal. The latter will devote his sole attention to development of the Home mine.

HAMILTON SMITH, representing the London Exploration Co., left London for San Francisco on the 5th and is expected in California about the 21st inst.

B. N. SHOECRAFT, formerly of Nevada Co., Cal., is Sec'y Champion, Spanish and St. Gothard M. Cos., with offices at 113-114 Crocker Bldg., San Francisco.

AUSTIN BROWN of Butte, Mont., succeeds T. H. Oxnam as Supt. Bully Hill mines at Sallee, Cal. His postoffice address is Bully Hill mines, Redding, Cal.

ROGER KNOX of Independence, Mo., has arranged to start and superintend the Revenue and Monitor mines, Madison Co., Montana, which will be worked together.

C. R. BROWN succeeds J. L. Parker as Supt. North Star mine, East Kootenay, B. C. Mr. Brown had been acting as agent for the company at Great Falls, Mont.

W. C. RALSTON, Pres. California Miners' Association and Vice-Pres. American Institute Mining Engineers, is expected in San Francisco from Boston, Mass., next week.

C. S. BATTERMAN, Supt. Boston & Montana and the Butte & Boston, is in San Francisco, en route to Butte, Mont. The two mines of which he is superintendent employ 3000 men.

S. J. SULLIVAN of Leadville, Colo., is now manager of mining property at Santa Eulalia, Mexico. J. W. Phillips of Leadville goes in similar capacity to the Helena M. Co., Cusihuirachic, Mexico.

JEWETT SCRANTON has been appointed by the Mountain Copper Co. Supt. of the newly acquired Balakala, Cal., copper properties, in addition to his superintendency of the Stowell and Windy Camp properties, Shasta Co., Cal.

MGR. W. S. NOYES of the Presidio M. Co. of Shafter, Tex., in which Gen. Shafter is largely interested, is visiting San Francisco. He has been successful in the United States and State Courts over Chicago men, who claimed the company's property through a forged Spanish land grant. The suit cost the company $27,000.

J. H. PRYOR, special agent General Land Office, is investigating the recent difficulties between the Mountain Copper Co. and the miners in Shasta Co., Cal., regarding attempted acquisition of mineral land under agricultural application.

J. D. MORGAN, in San Francisco from Nome, Alaska, says he and seven others bought eight claims, each 1320x660 feet, on El Dorado creek, Bonanza mine district, near Nome, for $40,000, and that he got 40 cents to the pan just below the surface.

JOHN HAYS HAMMOND has got through his inspection of Cripple Creek and Aspen, Colo., and is expected in California next week. During his Colorado sojourn, the Denver dailies have credited Mr. H. with having offered $40,000,000 for the Portland mine, discovered diamond fields in Pitkin Co., etc. Mr. H. is this week at Coronado Beach, San Diego Co., Cal.

M. C. BROWN, recently appointed district judge of Alaska, is in San Francisco en route to Sitka. His jurisdiction will extend over the entire territory of Alaska —one-fifth of the area of the whole United States—the largest jurisdiction entrusted to one man in the world. In going to Cape Nome, which is 2000 miles beyond Sitka, his headquarters, it will be necessary for him to return to Seattle, 1100 miles, to get a steamer for Behring sea, unless he should be sent to the Cape on a revenue cutter. From Seattle he will then have over 3000 miles of ocean voyage to make to reach his destination. He figures that it will require at least eighteen months to complete his circuit, paying one visit to each town.

Obituary.

CAPT. THOMAS MEIN.

Capt. Thomas Mein died at his Oakland, Cal., residence on the 4th inst., aged 62 years. He was born in Jedburgh, Scotland, April 1st, 1838, came to California in 1853 and mined in Nevada county. In 1884 he went to Venezuela as manager of the El Callao mine. Returning in 1889, he assumed the management of the Alaska-Treadwell mines on Douglas island, Alaska. Thence he went to South Africa in February, 1892, where he acted as general manager of the Robinson mine, taking prominent part in the Uitlander imbroglio that was the precursor of the present war. He returned to Oakland, Cal., in 1896, and during the last four years had been more occupied with attempts to limit the circle of his business engagements than to acquire new interests, though at the time of his death he was consulting engineer of the Alaska-Treadwell G. M. Co., the Alaska-Mexican G. M. Co. and the Alaska United G. M. Co. of Douglas island, Alaska; president and consulting engineer of the Alaska-Juneau G. M. Co. of Juneau, Alaska; the Oneida G. M. & M. Co. of Sutter Creek, Cal.; the Steeple Rock Development Co. of New Mexico, and the Mariposa Grant of Mariposa county, Cal.; principal owner of the Commodore G. M. Co. of Siskiyou county, Cal., and a director of the Alaska Exploration Co. He was a typical representative of the California mining man, of large affairs, world-wide renown, a man whose prestige was coupled with success in large undertakings, and who filled a most prominent place in the annals of mining in this country. His wife and two sons, R. M. and Wm. W., survive him.

Industrial Notes.

—The steamship Samoa sailed from Baltimore last Saturday for Vladivostock, Russia, carrying the largest shipment of steel rails ever sent from the United States to a foreign country, 8640 tons, invoiced at $21 a ton.

—There is a complicated system of weights and measures in use in the Philippine Islands. The unit of weight for hemp, sugar, copra and grain is the picul, which is equivalent to 139.4674 pounds, United States standard, and the picul is divided into 100 cates. Grain is also sold by dry measure. The standard is the cavan, which is equivalent to 68.1 United States quarts or 2.13 bushels. The cavan is made up of twenty-five gantas (2.724 quarts each), which in turn contain eight chupas (22.88 cubic inches each) of four aptanes each (5.644 cubic inches in each aptan). Tobacco and ramie are sold by the quintal, in bales of two, three or four quintals each. The quintal is equivalent to 101.41 pounds and is divided into four arrobes of 25.35 pounds. Oil sells in tinajas or jars of sixteen gantas each, the tinaja holding about 50.71 quarts and the ganta being equivalent to 3.17 quarts.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING MAY 1, 1900.

648,478.—AWNINGS—W. H. Arnold, Oakland, Cal.
648,720.—EXCAVATOR—G. W. Barnhart, S. F.
648,830.—PEN EXTRACTOR—J. D. Barrie, Los Angeles, Cal.
648,377.—RANGE FINDER—C. J. Beauvais, Phœnix, A. T.
648,456.—PANTS GUARD—I. H. Fay, Riverside, Cal.
648,614.—PUMP—M. M. Grove, Garfield, Wash.
648,867.—BUTTON—N. B. Hale, San Bernardino, Cal.
648,615.—BELT GUIDE—Hamilton & Drake, Ventura, Cal.
648,409.—THUMB RULE—P. R. Hazeltine, Los Angeles, Cal.
648,620.—LOADING PLATFORM—H. C. Holmes, S. F.
648,624.—SIDEWALK DOOR LOCK—P. H. Jackson, S. F.
648,511.—HANDSAWS—J. G. Lyons, Cosmopolis, Wash.
648,766.—PIPE WRENCH—R. MacKay, Los Angeles, Cal.
648,513.—BASKET CARRIER—L. S. Manning, Oakland, Cal.
648,766.—DRILLING MACHINE—J. R. Nelson, DeLamar, Nev.
648,778.—VEHICLE BRAKE—Neumann & Hartmann, Seattle, Wash.
648,521.—CHOPPING BLOCK—M. Parolio, S. F.
648,795.—ROLLER BEARING—J. R. Richardson, Madera, Cal.
648,641.—CONVEYING MACHINE—A. P. Tatterson, Stockton, Cal.
648,576.—MEASURING RULE—W. B. Taylor, Walla Walla, Wash.
648,814.—CARD CASE—W. Trewartha, Angels, Cal.
648,645.—FOLDING CRATE—Wetzel & Shaw, Alameda, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PORTABLE ADJUSTABLE VESSEL-LOADING DEVICE.—H. C. Holmes, San Francisco, Cal., assignor to R. D. Chandler of same place. No. 648,630. Dated May 1, 1900. The object of this invention is to provide a device for the loading of vessels from wharves, and it is particularly adapted for the purpose of discharging wagons or carts directly upon a vessel's deck or into the hold. It consists of an extensible driveway comprising the sections, one of which is slidable with relation to the other, so that it may be extended for use or drawn in upon the other section for transportation. The supporting section has wheels under one end, and means for connecting the opposite end with a team or motor so that it can be moved from place to place. Suitable guide rollers are so arranged as to be turnable and relieve the friction of the sliding of the two parts of the driveway. Angle iron strips are bent at the ends of the side rails and form stops to prevent the vehicle wheels passing over the end of the driveway.

FOLDING CRATE.—Henry Wetzel, Alameda, Cal., and F. J. Shaw, Oakland, Cal. No. 648,645. Dated May 1, 1900. The object of this invention is to provide a crate or box which may be folded to small compass for transportation or storage, and extended into shape as a container and locked in its extended position. The sides and ends are made of spaced strips, vertical plates at the inner angles of the box or crate are hinged together along their meeting edges and have lateral extending sockets adapted to receive and support the end portions of the strips forming said sides and ends. A hinged top and bottom and hinged plates extend across and project beyond the adjacent edges of the top, bottom and sides, and said hinged plates have interlocking loops which are adapted to align and guided slide bolts are fitted to engage and interlock with said loops to hold the box in position. When the parts have been folded together they are retained in place by hook plates which extend over and engage with the opposite sides.

Latest Market Reports.

SAN FRANCISCO, May 10, 1900.

SILVER—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59¾c (1000 fine); San Francisco, 59¾c; Mexican dollars, 49c.

COPPER.—New York: Lake, 1 to 3 casks, 17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 17.00; carload lots, 16.50; Casting, 1 to 3 casks, 16.50; carload lots, 16.25. San Francisco: 17@17½. Mill copper plates, 21c; bars, 23@24c.

LEAD.—New York, $4.30; St. Louis, $4.35; San Francisco 4½c, carload lots, 4½c, 1000 to 4000 lbs.; pipe 7½, sheet 8½, bar 6¾c. London, Soft Spanish Lead, £16 15s = 3.50c per lb.

SPELTER. — New York, $4.45; St. Louis, $4.55; San Francisco, ton lots, 5¾c; 100-lb lots, 6c.

ANTIMONY. — New York, 10c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 40@45c ℔ lb.

IRON. —Pittsburg, pig, No. 2, foundry, $22.00; gray forge, $21.00; San Francisco, bar, per lb., 3¼c.

STEEL. — Billets, Pittsburg, $31.50; sheet bars, $35; San Francisco, bar, 11c to 18c per lb.

QUICKSILVER. — New York, $51.00; London, £9 10s; San Francisco, local, $51.50 ℔ flask of 76½ lbs. Export rates withdrawn.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

FERRO-MANGANESE. — Pittsburg, 80%, $125.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

SOLDER. — Half-and-half, 100-lb. lots, 20c; San Francisco, Plumbers', 100-lb. lots, 17c.

TIN.—New York, pig, $29; San Francisco, ton lots, 32c; 1000 lbs., 32½c; 500 lbs., 33c; less, 34c; bar tin, ℔ lb, 37½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

NICKEL.—New York, 45@50c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.70 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ℔ set; 14 oz., 40s., 10¾c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 33@35c ℔ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 2¼c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5¾@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $7.00; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 10, 1900.

9:30 A. M. SESSION.

100 Andes	06c	500 Mexican	23c
400 Belcher	10c	100 Occidental	11c
700 B. & B	29c	300 Ophir	46c
100 Caledonia	98c	200	47c
300 Challar	17c	500 Overman	17c
400 C. C. & V.	$1 50	700 Potosi	18c
300 Confidence	70c	300 Sierra Nev.	30c
400 H. & N.	27c	300 Y. Jacket	15c

2:30 P. M. SESSION.

100 Ophir	47c	100 H. & N.	28c
300	48c	150 Sierra Nev.	31c
200	49c	200 Utah	06c
200 Challar	18c	100 Caledonia	90c
300 B. & B	29c	100 Challenge	12c
800 C. C.& V.	$1 50	100 Occidental	11c
200 Potosi	17c		

Commercial Paragraphs.

FLINT & LOMAX, Denver, Colo., have sold a 15 H. P. belted Triumph motor to the A. H. Wise Manufacturing Co. and a 30 H. P. belted Triumph motor to the F. McRay I. W. Co.

C. H. FISHER, representing the Risdon Iron Works of San Francisco, is at the Golconda mine, Bourne district, Baker county, Or., putting in an additional 10-stamp mill and four concentrators.

THE Link Belt Machinery Co. of Chicago has sold to the Goodman Manufacturing Co. the patterns, stock and good will of that part of their business known as the electrical mining machinery department.

THE Denver, Colo., office of the Edward P. Allis Co. has a contract with the Colorado & Southern Railway Co. for three Reynolds Corliss engines and four 150 H. P. boilers for the new shops of the company.

PROF. C. L. CORY of the College of Mechanical and Electrical Engineering of the University of California, at Berkeley, Cal., has become an associate member of the engineering firm of Benjamin, Hunt & Meredith of San Francisco. This combination of engineers, formed one year ago, already occupies an important position in the engineering field on this coast. A. M. Hunt, the senior member, is the chief engineer and Gen. Mgr. Independent Electric Light & Power Co. of San Francisco, on which work is rapidly progressing. This plant, when completed, will have a capacity of 30,000 H. P., and is intended to be the most modern and complete in the country; the Yuba electric plant of 15,000 H. P. has been installed; the Truckee River General Electric plant of 3000 H. P., and D. S. Cone's Red Bluff, Cal., plant of 1500 H. P. are in course of construction. Plans and specifications have been prepared for two other 4000 H. P. transmission plants. Numerous expert tests have been made on plants in operation in various parts of the State, and reports have been made upon twenty-six mining properties. The work completed in the past year, that now under way and that in contemplation represents an expenditure of over $10,000,000. The association of Prof. Cory with these gentlemen should add increased ability and popularity to this prosperous firm.

Recently Declared Mining Dividends.

Daly-West, Utah, 25 cents per share, $150,000 ..... May 15
Portland G. M. Co., Colorado, 2 cents per share, $60,000 ..... May 20
Cordell Z. & L. M. Co., 5 cents per share ..... May 15
Montana O. P. Co., $1 per share, $80,000 ..... May 21

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

M. S. HAUSER,
Room 38, 12 Front St., San Francisco, Cal.
Will act as purchasing agent for mining companies.
Will use the benefit of his wide experience in getting the best articles at the lowest prices, securing low freight rates, and prompt delivery.
Will submit estimates on all kinds of supplies.
Will work for either a small salary or a commission, and show a saving greatly in excess of charges.

WANTED.
A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.
Address: **EDWARD N. BREITUNG,**
MARQUETTE, MICH.

HARVARD UNIVERSITY.
Lawrence Scientific School.
Twelve Departments of study leading to the degree of Bachelor of Science. Civil Engineering, Electrical Engineering, Mechanical Engineering, Mining and Metallurgy, Architecture, Landscape Architecture, Chemistry, Geology, Biology, Anatomy and Physiology, For Teachers of Science, and General Science.
For Descriptive Pamphlet apply to
J. L. LOVE, Secretary, Cambridge, Mass.
N. S. SHALER, Dean.

FOR SALE.
Gold Placer Ground (U. S. Patent) in Western States.—The owners of a well-tested property of about 400 acres, suitable for working by dredging, being unable to work same themselves, invite full investigation with a view to sale of the whole or an interest. Reply K. B. C., Mining and Scientific Press.

WANTED,
A Developed Copper Property.
A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.
H. E. RUNKLE, Mining Broker, El Paso, Texas.

Group of Gold and Silver Mines for Sale.
For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.
For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

FOR SALE.
Mine and Mill Now Running.
Will sell part or whole, for cash or on bond. Plenty $10 to $35 rock in sight. Everything straight and bona fide. Disagreement of partners. Full examination invited. Principals only. Address J. G., this office.

A BARGAIN.
3500 feet of 16-inch, 5 B. W. G. National Tube Works seamless pipe. Kimberly joints. Immediate delivery.
Address PIPI, Room No. 140, No. 32 Broadway, New York City.

STEEL RAILS FOR SALE.
300 tons 30-lb. Relaying T Rails; 40 tons 25-lb. Relaying T Rails; 30 tons 20-lb. Relaying T Rails; 10 tons 12 and 16-lb. New T Rails. 1 Porter Saddle Tank, narrow gauge. Correspondence solicited.
C. J. TALLON,
308 Market Street, San Francisco, Cal.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

LOCOMOTIVE WANTED FOR CASH.
One 36-in. Gage, Saddle Tank preferred.
Cylinder about 9-in. diameter by 14-in. stroke, or larger.
Also, ONE STEAM SHOVEL.
Would consider purchasing Little Giant Traction.
In replying, send full specifications, including age, present condition, location and lowest cash price. Address CONTRACTOR, 1603 Monadnock Block, Chicago.

ANNUAL MEETING.
The Regular Annual Meeting of the Stockholders of the National Cons. Mining Company will be held at the office of the company, 773 Mission St., San Francisco, California, on MONDAY, the 4th day of June, 1900, at the hour of 8 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting.
GEO. W. FLEISSNER, Secretary.
Office—773 Mission St., San Francisco, California.

ANNUAL MEETING OF STOCKHOLDERS.
In accordance with the by-laws of that company, the Regular Annual Meeting of the Stockholders of the Jamison Mining Company will be held at the office of the company, Room 54, 120 Sutter St., San Francisco, California, on Monday, the 21st day of May, 1900, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. Transfer books will close on Saturday, the 19th day of May, 1900, at 12 o'clock M. and open again at 10 o'clock A. M. on Tuesday, the 22nd day of May, 1900.
SAM. W. CHEYNEY, Secretary.
Office—Rooms 54 and 59, 120 Sutter St., San Francisco, California.

Atlin Gold Fields,
British Columbia.
Of particular interest to HYDRAULIC OPERATORS and experienced QUARTZ PROSPECTORS.
American miners can pre-empt claims.
For further particulars write
BROWNLEE & LOWRY,
Civil and Hydraulic Engineers and Land Surveyors,
Atlin, British Columbia.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

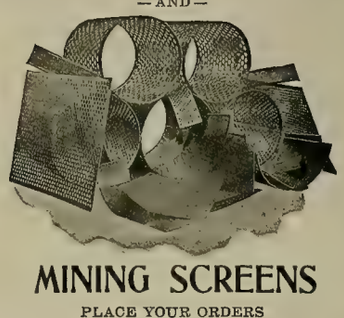
SITUATIONS WANTED.
Machinist and Mill Foreman is open for engagement. Several years of practical experience with amalgamating and concentrating gold ores Stamps, Huntington or Bryan mills. Best of references. Address "Mill Foreman," this office.

WANTED.—Position as superintendent, or to take charge, by a thorough practical miner and mechanic of eleven years' experience. Good draughtsman. Opening up new properties a specialty. Copper or gold mining preferred Good references. Address B. C., care of Mining and Scientific Press.

Millman and Experienced Assayer
Desires Position.
Best of reference furnished. Address A. B. C., this office.

Experienced Cyanide Man
IS OPEN FOR ENGAGEMENT.
Salary or percentage. Address T. O. M., care of Mining and Scientific Press.

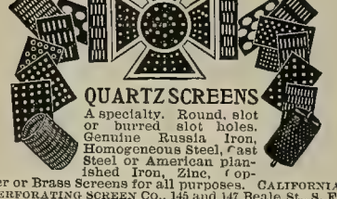
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—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

For Best Satisfaction and Lowest Prices
—IN—
PERFORATED METALS
—AND—

MINING SCREENS
PLACE YOUR ORDERS WITH
Fraser & Chalmers,
CHICAGO, ILL., U. S. A.
SEND FOR SAMPLES, MENTIONING THIS PAPER.



Mining Screens
A SPECIALTY.
Diagonal Slot, Straight " Burred " Round Holes.
In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.


—EASTERN PRICES BEATEN.—
SAN FRANCISCO Pioneer Screen Works,
JOHN W. QUICK, Prop.
Improved Facilities! Finest Work! Lowest Prices!
Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.
MINING SCREENS A SPECIALTY.
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QUARTZ SCREENS
A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F.



CAPE NOME MACHINERY.

CYCLONE
Gold Separator and Amalgamator.
Closest gold saver. Lightest weight, most compact, and only device which can be worked on land or under water. Call and see test made. WM. H. BIRCH & CO., 135 First St., San Francisco, Cal.

ENGINES,

1 to 18 H. P., Weighing 175 to 1800 Lbs.
PRICES $60 TO $250.
Special Sectional Boilers, no piece weighing over 80 pounds, with prices less than ordinary boiler
RIX ENGINEERING & SUPPLY CO.,
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CAPE NOME
PORTABLE MINERS' HOUSES.
New System. Warm and Substantial.
Very compact when knocked down for shipment.
BURNHAM STANDEFORD CO., Washington & 1st Sts., Oakland, or Builders' Exchange, San Francisco.

CAPE NOME.
Boilers, Engines, Hoists,
FOR IMMEDIATE SHIPMENT.
BAKER & HAMILTON,
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Trade Mark. Trade Mark.

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Jena Normal Glass,
THE BEST LABORATORY WARE MADE.

Everything necessary for the
Assayer and Chemist
will be furnished of best quality at
reasonable prices.

UNEXCELLED BALANCES, WEIGHTS AND PLATINUM.

EIMER & AMEND,
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SADDLES.
CATALOGUE FREE.
L. D. Stone & Co., San Francisco, 417 and 419 Market Street.
A. KEMPKEY & F. M. GILHAM, Proprietors.

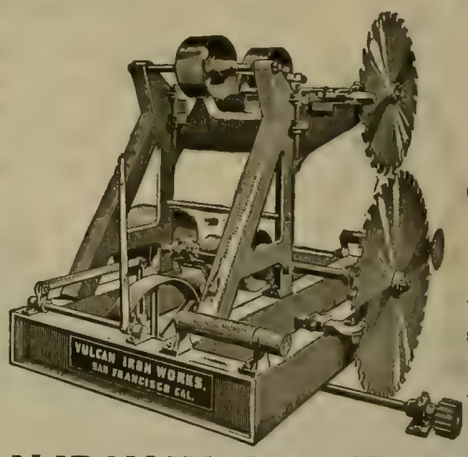
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Single Circular.
4000 - 6000 feet per day.

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8,000 - 10,000 ft. per day.

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Double Circular.
15,000-20,000 ft. per day.

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Double Circular.
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Mining Companies
—OR—
Other Consumers of Lumber at Remote Points.

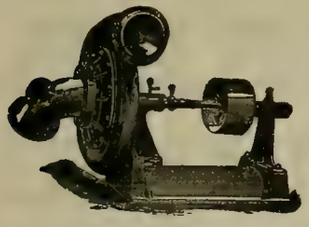
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Manufactured by
VULCAN IRON WORKS,
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CAPE NOME MACHINERY.
THE KROGH MFG. CO.
—BUILDS—
CEMENT GRAVEL MILLS, THE "DRAKE" AMALGAMATOR, THE "KROGH" 2-STAMP MILL AND MINING MACHINERY OF ALL KINDS.

The Krogh Centrifugal Pumps are the Best for CAPE NOME SANDS.
Capacity from 1 to 100,000 gallons per minute.
Send for Illustrated Catalogue.

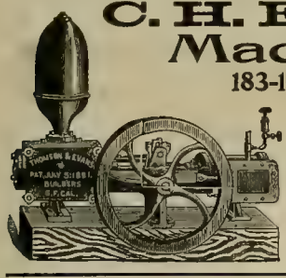
KROGH MANUFACTURING CO.,
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CAPE NOME
PUMPING MACHINERY.
BUILT LIGHT AND STRONG.
COMPLETE PLANT IN OPERATION AT OUR WORKS.
Centrifugal Pump and Steam or Oil Engine Direct Connected.
Sand Pumps, Rock and Gravel Pumps, Mining Machinery, etc.

Jackson's Whirlpool Centrifugal Pumps. Capacities from 50 gallons to 50,000 gallons per minute.

BYRON JACKSON MACHINE WORKS,
625-631 SIXTH STREET, SAN FRANCISCO, CAL.



C. H. EVANS & CO.,
Machine Works,
183-185-187 FREMONT STREET,
Where, with Enlarged and Increased Facilities, they are better than ever prepared to do
First-Class Machine Work
Promptly, and at Reasonable Prices, and will continue the manufacture of
Thomson & Evans Steam Pumps,
Deep Well Pumps, Power Pumps, Etc.,
Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

All miners who have used the
TRUAX
Automatic Ore Cars
say they are the best cars on the market.
OVER THREE THOUSAND IN USE.
Manufactured in San Francisco, Cal., by
THE TRUAX MFG. CO.,
114 FIRST STREET.

IMPROVED 1898.



Patented: Jan. 5, 1892. Aug. 27, 1895. July 19, 1898.
In Canada: June 21, 1898.

Manufactured in Denver, Colorado, by
THE TRUAX MFG. CO.,
1717-1719 WAZEE ST.
We make all kinds of Cars, Skips and Charging Carts for the Mine Mill and Smelter.
SEND FOR PAMPHLET.
Dealers Wanted in Mining Sections to Handle the Truax Ore Cars.

SMOOTH-ON CASTINGS.
TRADE MARK.

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL.....AGENTS FOR PACIFIC COAST.

THE U.S. INJECTOR



USED BY THE UNITED STATES GOVERNMENT

THE AMERICAN INJECTOR CO.
DETROIT·MICHIGAN

STEEL RAILS, TRACK FIXTURES,
PRODUCT PENNSYLVANIA STEEL COMPANY.

BAR, SHEET AND BOILER STEEL,
STRUCTURAL MATERIAL,
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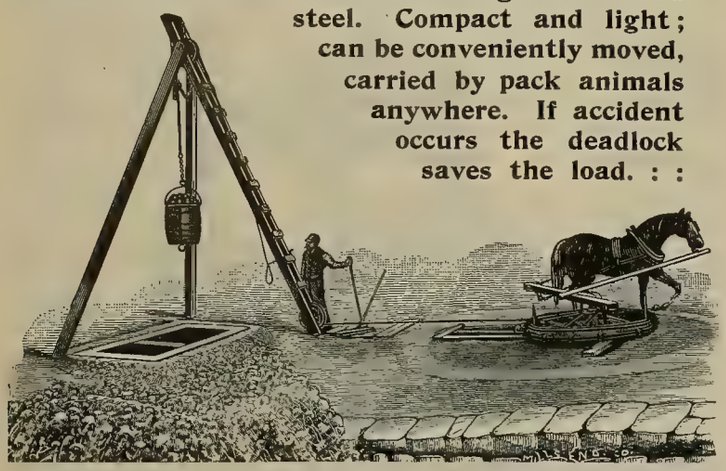
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FOR REMOVING SLIMES
BROMINE
CYANIDE
CHLORINATION
And Other Aquarious Chemical Solutions.
OUR FILTER PRESS Removes all Slimes and Hastens the Deposition of the Metals.
THE STILWELL-BIERCE & SMITH-VAILE CO., Dayton, Ohio.
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WEST COAST OF MEXICO.
WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.
Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

THE COMMON SENSE WHIM

Is made of the best wrought iron and steel. Compact and light; can be conveniently moved, carried by pack animals anywhere. If accident occurs the deadlock saves the load. : :



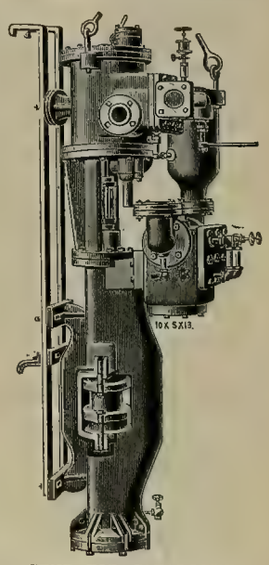
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Indispensable in sinking mining shafts or pumping out flooded mines. Easily raised or lowered by cable or rope. Equipped with outside packed plungers. Handles gritty or dirty water. Operates bolted to shaft timbers or only suspended by cable at any angle. Packing glands external. May be adjusted while in motion. Removable parts hinged. Steam movement positive and simple.

THE RISDON IRON WORKS,

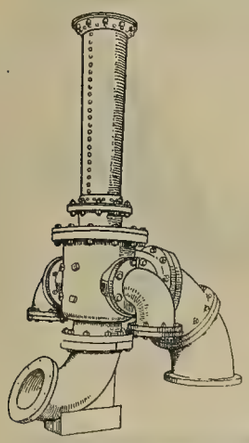
MANUFACTURERS,

SAN FRANCISCO, CAL.



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THE EVANS HYDRAULIC ELEVATOR,



MANUFACTURED BY

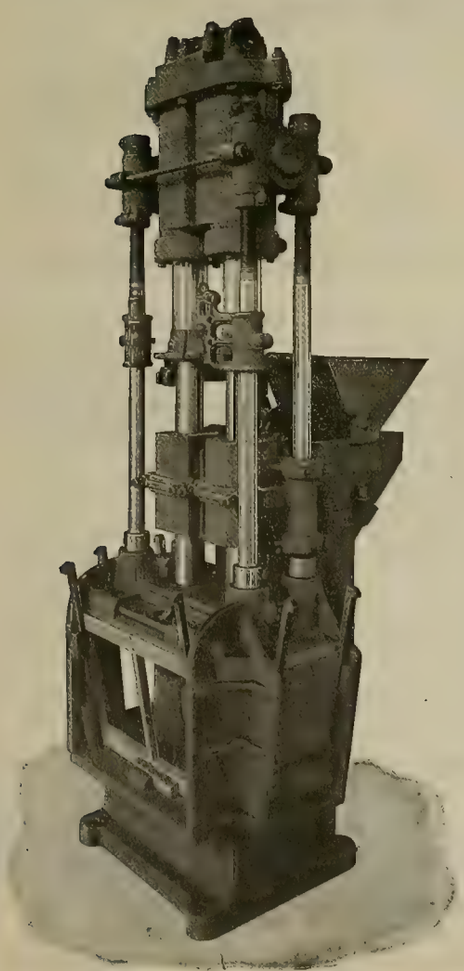
RISDON IRON WORKS, San Francisco.

Used in Unwatering the Comstock Lode.

SEND FOR CATALOGUE NO. 5.

The cheapest and most efficient Water Elevator made.
It will do more and better work than any other Gravel Elevator.
It is fully protected by United States and Canadian letters patent.

GATES IRON WORKS.



THE TREMAIN STEAM STAMP MILL

has made many fortunes for its owners. It costs but little money. Can be transported anywhere.

CHICAGO, ILLS., Jan. 18th, 1900.

GATES IRON WORKS, CHICAGO, ILLS.

MY DEAR SIRS:—

Replying to your letter of the 17th inst., asking what we have done with the Tremain Mill at the Storm Cloud Gold Mines near Prescott, Arizona, in the past year, will say that we have been unable to run the Mill more than three days out of the week, owing to the fact that we have had, during the past year, but little rain. We were obliged to use settling tanks and save what little water we had, in order to run three days per week. The Mill has worked splendidly—in fact, it is a perfect little giant to do business with, where you have plenty of water for amalgamating purposes.

Enclosed I hand you a statement amounting to $20,210.72, which is the total product of the Mill for the twelve months, giving dates that we sent the bars to the mint at San Francisco and the amount we received for each bar.

I think the Tremain Mill is the best friend that a prospector or an individual who has practically a good mine can get hold of, to furnish him money to develop his property. I bought the Storm Cloud Gold Mines the last of June in 1897. In the fall of that year I bought, as you know, one of your Tremain Mills. From the day I started it it has paid all my developing expenses, and from the report made by the geologist of Arizona, December last, I now have $940,000 of ore blocked out, the expense of which has been paid from the net proceeds of the Tremain Mill. I have paid for over 1800 feet of development work with this Mill since I erected it two years ago last October. My experience teaches me that if anyone has any trouble with the Tremain Mill it is the fault of the man who operates it.

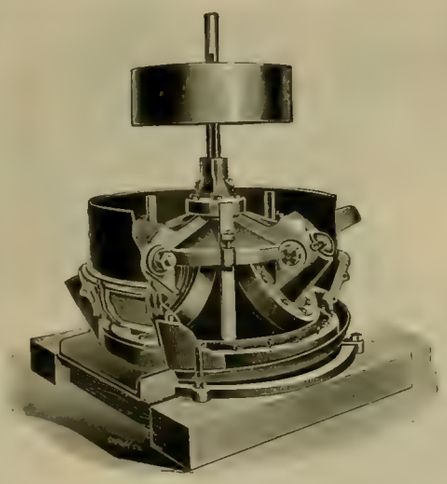
Yours very truly,

WHITING G. PRESS.

Send for Catalogue No. 8.

San Francisco Agents:
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20 & 22 Fremont St.

MAIN OFFICE AND WORKS:
650 ELSTON AVENUE,
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THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

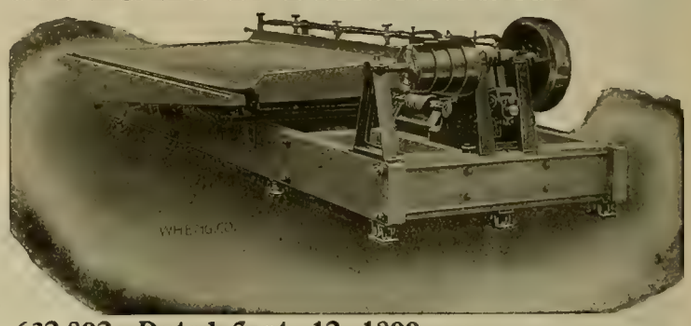
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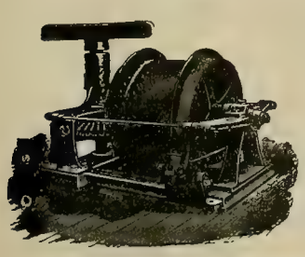
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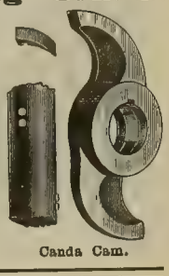
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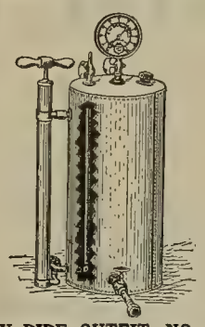
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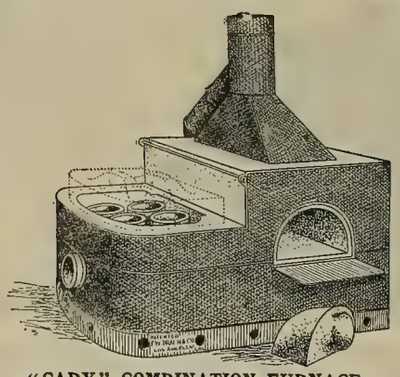
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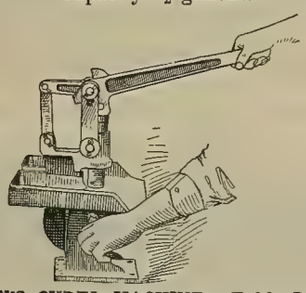
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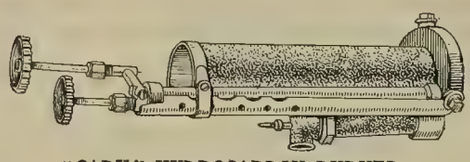
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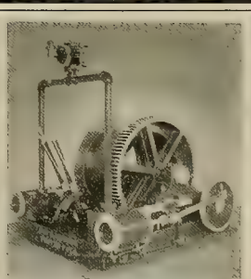
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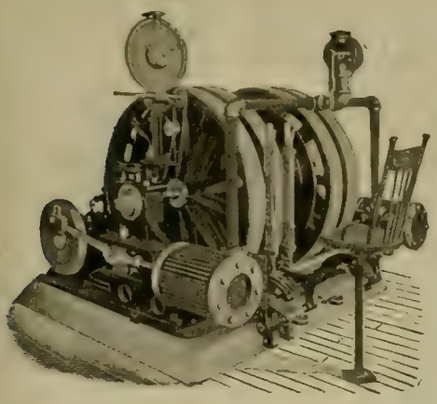
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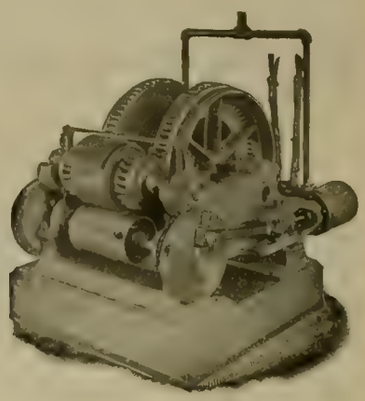
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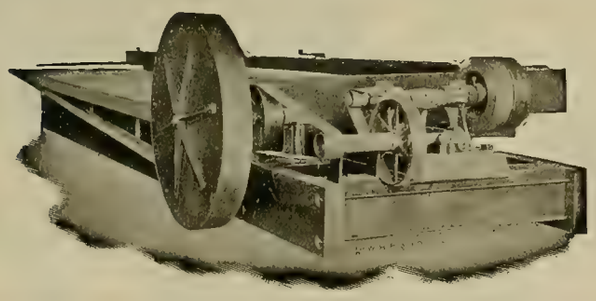
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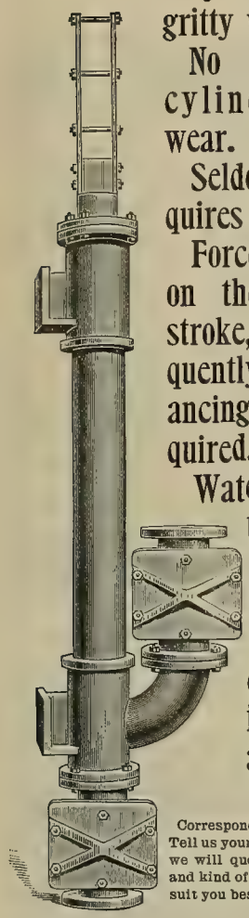
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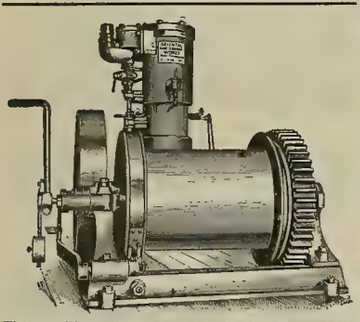


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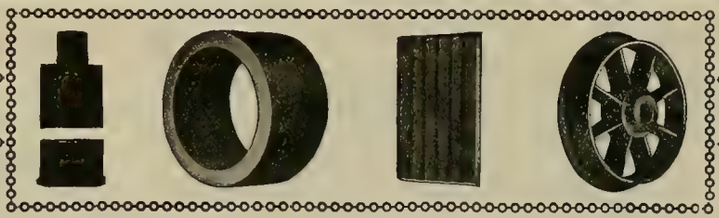
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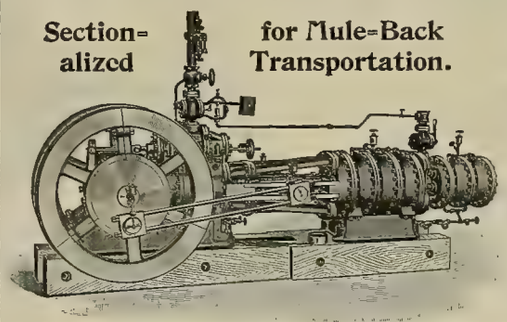
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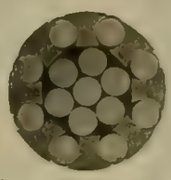
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BLEICHERT WIRE ROPE TRAMWAY

And other systems of aerial transportation.



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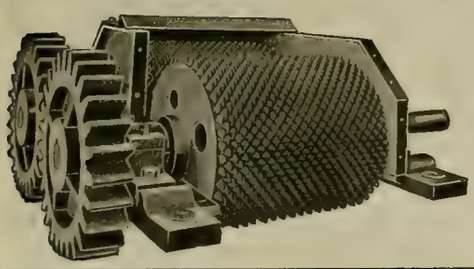
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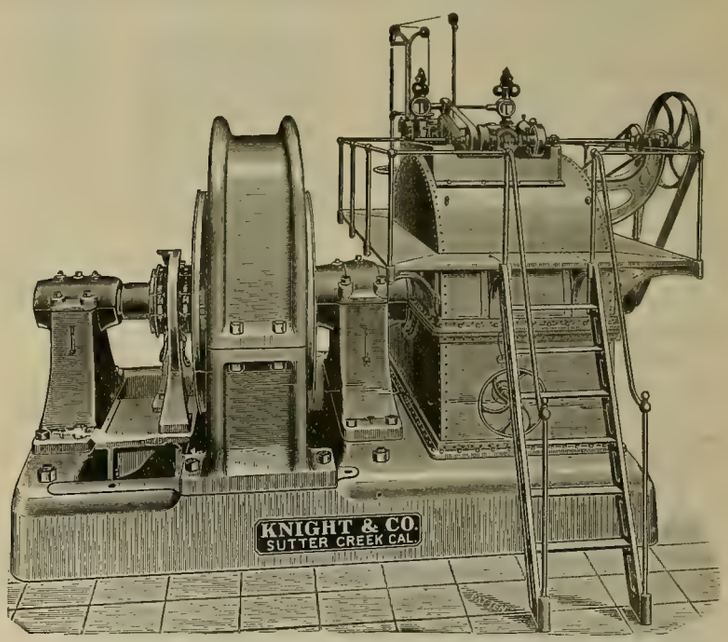
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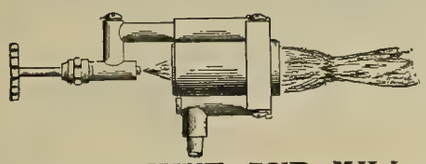


The accompanying cut shows the general arrangement of **The Knight Water Wheel,** direc-coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.
Wheels for mill and reversible hoisting works a specialty.

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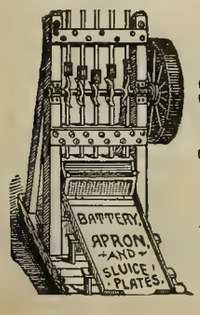


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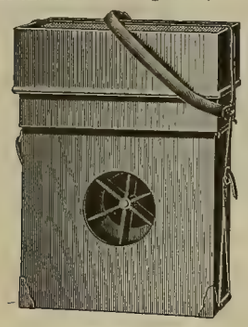
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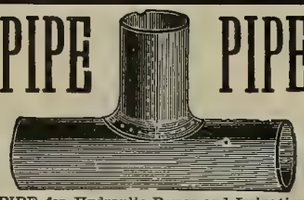
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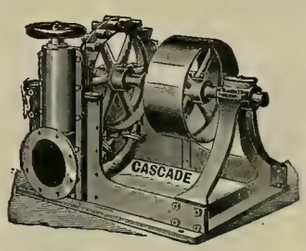
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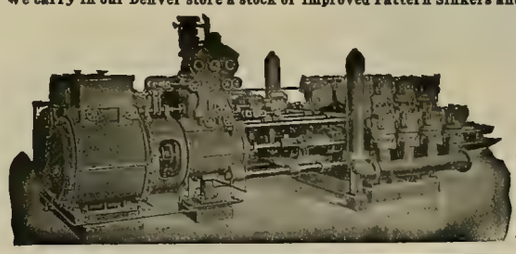
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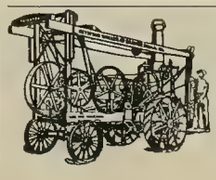
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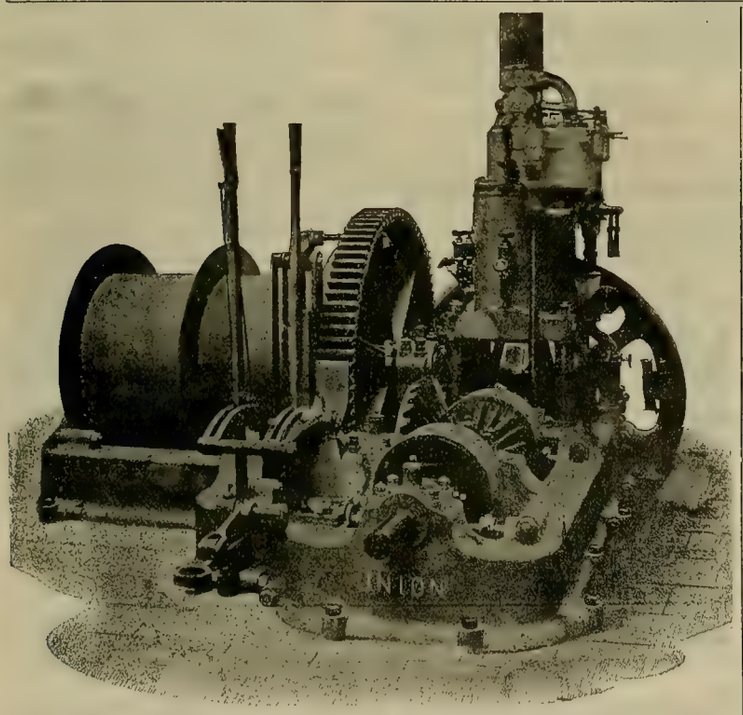
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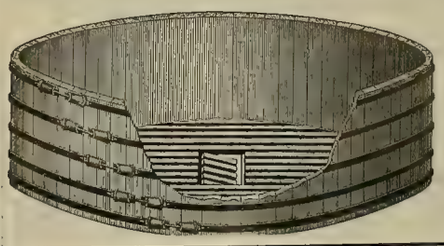
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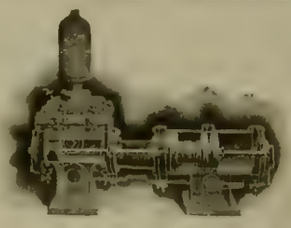


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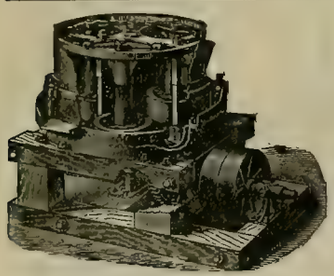
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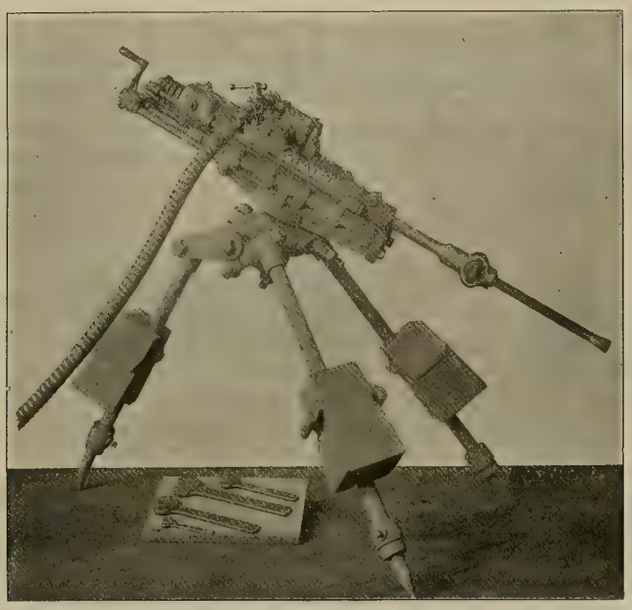
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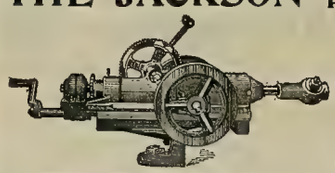
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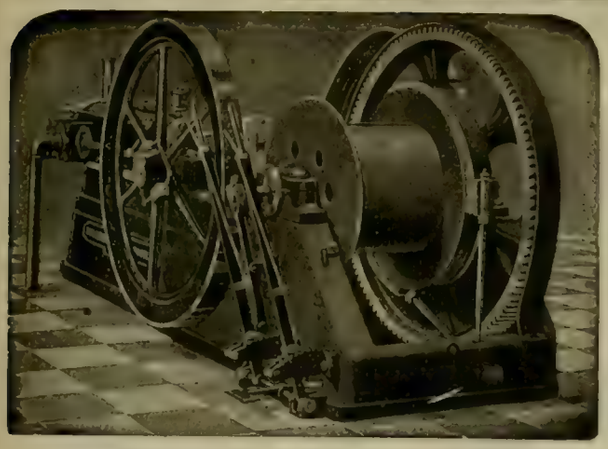
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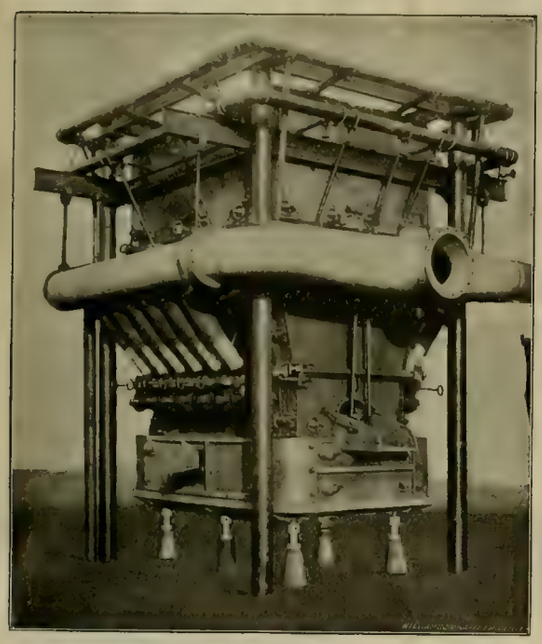
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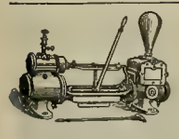
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H. Heckmann, Trustee	67	500	10 00
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H. Heckmann, Trustee	69	500	10 00
H. Heckmann, Trustee	70	200	4 00
H. Heckmann, Trustee	71	200	4 00
H. Heckmann, Trustee	72	200	4 00
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P. A. Wagner, Trustee	90	980	19 60
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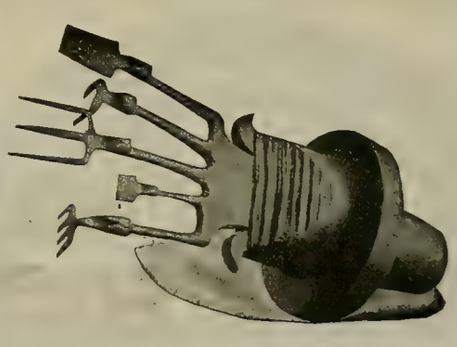
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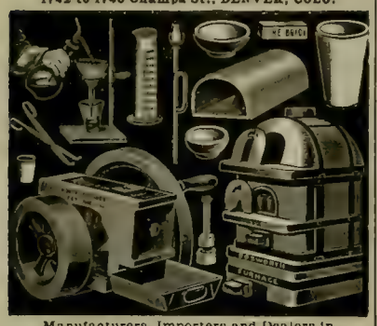
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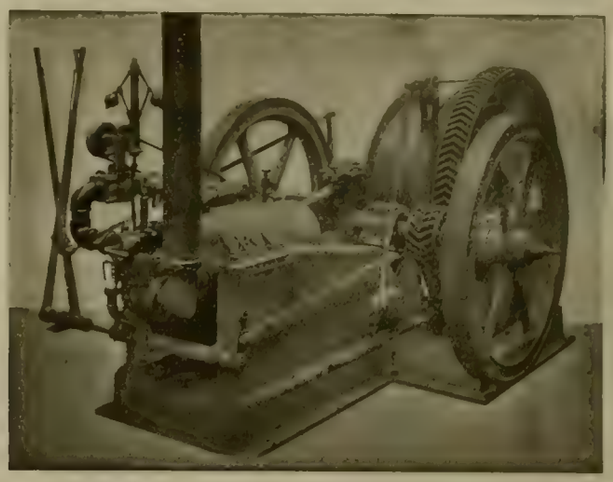
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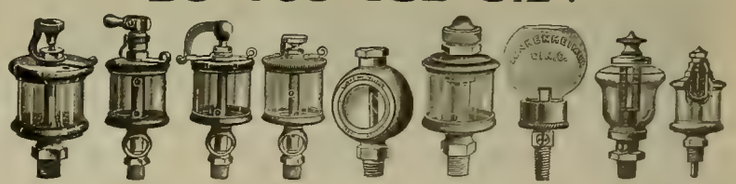
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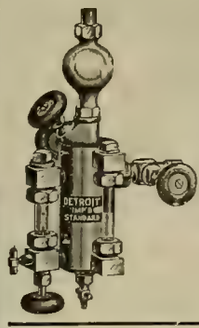
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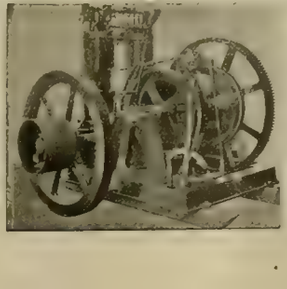
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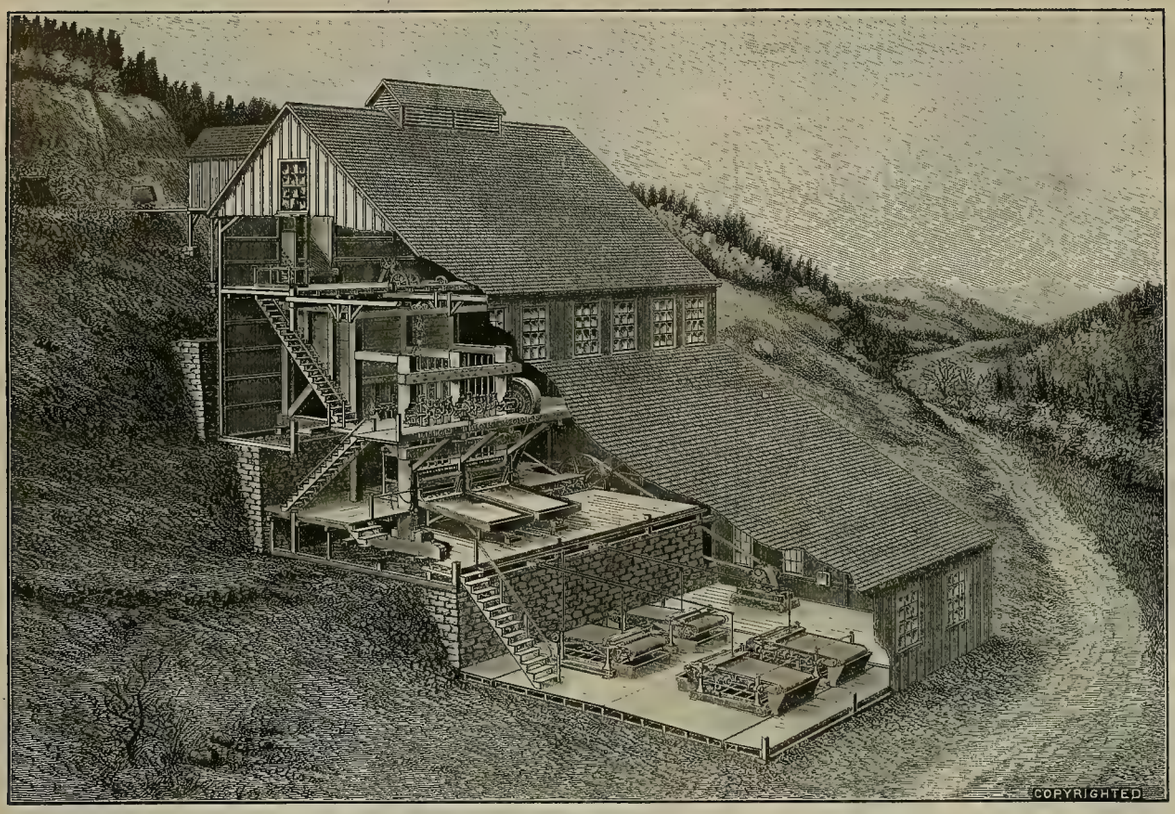
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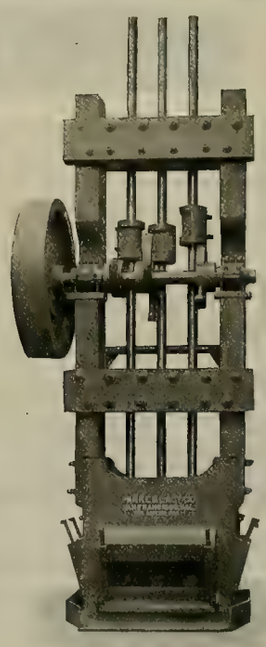
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Parting Gold and Silver Bullion.

There are three methods of parting gold and silver: the nitric acid, the sulphuric acid, and the electrolytic process, respectively. The latter is well adapted to large smelting works. The nitric acid process is the oldest. It is thoroughly satisfactory, but the comparatively high price of nitric acid and the necessity of using either platinum or porcelain vessels has led to its being superseded in many modern refineries by the sulphuric acid parting process. Diluted sulphuric acid has no action on silver, but the strong acid, when heated, is decomposed by that metal, giving off sulphurous acid and forming silver oxide, which passes into solution in the excess of acid as silver sulphate. If gold is present in percentage, not to exceed one-third of the whole, strong sulphuric acid will extract the silver and leave the gold as a granular brown sediment. Should the bullion contain one-half gold, the latter metal will protect the silver against acid attack, and the result will be failure. It is the business of the refiner to adjust for the melting pot gold deposits with those of silver carrying small quantities of gold, or to add fine silver so as to have from two to three parts of silver for each part of gold. Such an admixture is melted in a large crucible, thoroughly mixed, and then, with a dipping cup, is poured into cold water. Most bullion contains varying quantities of copper, and this metal works very badly in strong sulphuric acid. While decomposing the acid with formation of copper sulphate, the latter, unlike the silver sulphate, is insoluble in oil of vitriol, hence, if present in any considerable quantity, copper soon acts as a protector to the bullion and the chemical action either ceases or becomes tediously slow. Besides apportioning the silver to gold, it is necessary, therefore, to so combine deposits that the granulations do not contain more than 6% to 8% of copper. The success of this process really depends upon the fact that while weak sulphuric acid rapidly dissolves iron, yet, if the acid be strong enough, it has no appreciable action—just the reverse of its relations to silver. Cast-iron vessels may, therefore, be employed. Large iron kettles are used, weighing half a ton, mounted over a furnace. Into this a charge of 300 to 400 pounds of granulated bullion is placed, and covered with three or four times its weight of acid—66 B. Heat is applied, when a lively evolution of sulphurous acid sets in, which, if too violent, must be checked by the addition of a little cold acid and slackening of the fire. This boiling is continued for several hours, during which time the escaping and consumed acids are gradually replaced. When the solution is complete the fire is withdrawn and the contents of the kettle allowed to quietly settle. A little cold acid is added to aid the precipitation of any suspended gold. Hoods over the kettles carry off the fumes to condensing and suppression apparatus. The strongly acid solution, while still hot, is siphoned off into the reducing houses. These are long, rectangular vats lined with lead, and provided with sloping covers. Slabs or ingots of metallic copper are placed on the bottom and sides of these vats, which are then partly filled with cold water. The hot silver solution is then run in, with resultant crackling and spluttering. The result is a weak solution of silver sulphate, rendered milky by the separation of fine crystals of that salt, the solubility of which is very slight in pure water. The copper immediately begins to precipitate the silver as a crystalline mass, easily detachable from the plates when the operation is complete. This requires about twenty-four hours. Meanwhile the copper has taken the place of silver, leaving a strong solution of copper sulphate (blue vitriol). This blue solution is drawn off for crystallization, and the spongy silver carefully transferred to leaching tubs for thorough sweetening with fresh water. The silver, now in the form of minute, flaky crystals, is compacted into cakes by means of hydraulic pressure and these cakes dried in a current of warm water, after which a simple fusion in a black-lead crucible without fluxes gives a bullion 0.998 or 0.999 fine. If silenium or tellurium is present in the bullion, it will pass into solution with the silver and be deposited with it by the copper plates. In this case the spongy silver will be dark colored and the melt will be brittle. It must then be fluxed with niter. The sulphate of copper is then carefully prepared for the market, the proceeds thus materially reducing the expense.



Spruce Creek, Atlin, B. C.



A Letter from Home, McKee Creek, Atlin, B. C.



Discovery on Wright Creek, Atlin, B. C.

(See Page 549.)

MINING AND SCIENTIFIC PRESS.

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San Francisco, May 19, 1900.

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A BILL has been introduced in the House of Representatives by a Utah Congressman providing that work on an unpatented mining claim in excess annually of $100 in amount shall be considered as applying to adjoining claims held by the same owners. There is a good deal of well meant but ineffectual effort to secure favorable mining legislation in Congress, some of which, if directed to forwarding the bill creating a Cabinet position of mines and mining would be of practical value and definite result.

IN the U. S. Senate last week a long discussion was precipitated over the bill to apply a portion of the proceeds of the sale of public lands to the endowment, support and maintenance of schools and a department of mining and metallurgy in several States and Territories in connection with colleges, the benefit of agriculture and the mechanical arts, each college to receive $10,000 for the year 1901 and $1000 additional each succeeding year until the amount received by each college shall be $15,000 annually. Thus, it was pointed out, the measure appropriated $500,000 for the first year and $750,000 annually at end of five years. Eastern Senators opposed the measure.

IT is unpleasant to continually make adverse criticism of governmental rulings, but it would appear that a hide-bound system of bureaucracy is again being adopted at Washington in nearly everything relating to the mining industry. The Secretary of the Interior now rules that permits for cutting timber for mining purposes shall be given only to companies with paying mines. This rules out the prospector. It is enforcement of the rigid letter of the law, but in opposition to its spirit. The miners were not made for the law; the law was made for the miners. It was, of course, the intent to protect timber land from unlawful depredation. That is right, and the miner will gladly aid in its enforcement, but it is quite another thing to make so sweeping and arbitrary a ruling. This is not Russia, nor South Africa, and the prospector or individual miner trying to develop his claim has rights that no official can afford to disregard. Timber is a necessity to the miner. Heretofore the miner was allowed to cut enough off his location for necessary use in its development. The fairness and justice of this was universally recognized—even in the office of the Secretary of the Interior at Washington. Anything that can in reason be done to encourage the development of the mineral wealth of the country should be done, with due regard to the preservation and conservation of forest growth, but there is neither rhyme nor reason in the latest edict promulgated from government headquarters.

South African Mine Conditions.

The current issue of the London Mining Journal, commenting on the report of the leading gold property of the South African Rand, makes comment which, under the circumstances, is considered worthy of reproduction. Our London contemporary says:

The directors of the Robinson Gold Mining Co. have just issued their report for the year 1899, and considering its uniqueness in more than one respect it is an interesting document. For instance, there are items and figures in it which will not reappear in any future report, and as a relic of a memorable year in the fortunes of the company it will be worth preserving. Since October last the property has been controlled by the hostile Government of the South African Republic, but for the nine months ending September the profits were much larger than for those of any similar period in the history of the company, thus showing what an exceptional year of prosperity the company would have enjoyed had it not been for the interruption caused by the war. It is interesting to note the quantity and value of the gold seized by the Transvaal Government. The following table shows what was seized from the train on October 2:

	Bullion, Ounces.	Estimated value. £	s.	d.
Mill gold	5,700.460	20,730	0	0
Cyanide gold	1,228.700	4,410	0	0
Chlorination gold (own)	75.110	310	7	0
Chlorination gold (bought)	1,090.490	4,503	13	0
Total	8,094.760			
Insurance on above		86	18	6
Total		£30,040	18	6

The following was taken possession of at the mine on October 13:

	Bullion, Ounces.	Estimated value. £	s.	d.
Mill gold	1,736.000	6,520	0	0
Mill gold (samples)	57.000			
Cyanide gold	937.000	3,340	0	0
Totals	2,730.000	9,860	0	0

making a total of 10,824.760 ounces, of an estimated value of close on £40,000. This is a big item, but, in accordance with the usual practice, it was duly covered by insurance, but so far the insurance companies have refused to make good the company's loss. Altogether the net profit for the year amounted to £424,290, out of which the directors declared a dividend of 8s per share, equal to 8%, absorbing £220,000, leaving considerably over £200,000 to be carried forward. These improved results were due in a chief measure to the enlargement of the mill by another twenty stamps and to the replacing of forty stamps by those of a heavier type. Furthermore, a complete cleanup of the plates and all gold-bearing material in and around the reduction works was made before the war, and the value it realized has been included in the accounts. While there was an improvement of 3s 1.4d per ton in the recovery from the plates, there was a falling off in secondary treatment results equal to 3s 5.3d, without regard to revenue from slimes. The manager assigns the main reason for this deterioration in the greater tonnages of ore drawn from the eastern mine and in the steadily increased proportion of main reef leader over south reef.

On actual working expenses there was shown a reduction of 1s 4.6d per ton. Less money was spent on mine development than in the previous year, but sufficient milling ore was opened up to maintain the reserves at about the figures reached at the close of 1898, viz., approximately 750,000 tons, exclusive of main reef. An excellent amount of work was done during the nine months. Both main shafts are now down to the thirteenth level, and the work of cutting the stations thereat was well advanced when operations were suspended in October last. The ore hoisted amounted to 223,008 tons, of which 57,973 tons were sorted out as waste above ground; 165,444 tons were milled, while the full mill of 140 stamps ran 266½ days, crushing 4.429 tons per stamp per day, a slight improvement upon the previous year's work. At the cyanide works 116,130 tons of sands and concentrates were dealt with, the percentage caught relative to the tonnage milled being 70.2 as against 71.6% in 1898. The actual extraction was 77.2%, the same figure as in the previous year. Such, then, is the record of this great Rand mining company during 1899, and, considering the many difficulties and troubles which it had to face, it must be considered satisfactory. Long before the Boer ultimatum was issued the unrest in the Transvaal, engendered by the fears of the probable outbreak of war, had a most distracting influence on labor, causing an exodus of natives from all the mines. With respect to the company's future, it would be idle to indulge in prediction at the present time. In common with the majority of the other mines, great expenditure will be needed to restore the conditions of things prior to the outbreak of the war. But no one can forecast what that expenditure is likely to be, nor foretell when operations at the mine can be renewed. That we must leave to the future, and hope for the best.

Pending Mining Legislation.

The Alaska bill is not yet a law, and may not be enacted this session of Congress. It limits the field of free mining, cuts the beach into two parts, making mean high tide the dividing line. At Cape Nome "mean high tide" is more than half way up the beach to the tundra. Below this line are the "poor man's diggings."

Section 26 of the bill as it passed the Senate relates to beach mining. It is as follows:

The laws of the United States relating to mining claims, mineral locations and rights incident thereto are hereby extended to the district of Alaska; provided that, subject only to such general limitations as may be necessary to exempt navigation from artificial obstructions, all land and shoal water below mean high tide on the shores, bays and inlets of Bering sea within the jurisdiction of the United States shall be subject to exploration for gold and other precious metals by citizens of the United States, or persons who have legally declared their intentions to become such, under such reasonable rules and regulations as the miners in organized mining districts may have heretofore made or may hereafter make governing the temporary possession thereof for exploration and mining purposes until otherwise provided by law; provided further, that the rules and regulations established by the miners shall not be in conflict with the mining laws of the United States; and all permits heretofore granted authorizing any person or persons, corporation or company to excavate or mine under any of said waters are hereby revoked and declared null and void; and the reservation of a roadway 60 feet wide, under the tenth section of the Act of May 14, 1898, entitled "An Act extending the homestead laws and providing for right of way for railroads in the district of Alaska, and for other purposes," shall not apply to mineral lands or townsites.

Much of the difficulty and confusion arises from the placing of the line of "mean high tide." At Cape Nome there is only about 30 inches difference between high tide and low tide. Much of the entire beach on Seward peninsula has been pre-empted, and it is along this beach down to the tide line that those going there without capital or prior possessory rights may expect to work.

The one favorable thing from the miners' standpoint in the above excerpt from the proposed law is that it is with intent to give the miners themselves the power to regulate works in accordance with mining district laws as universally recognized in every mining camp anywhere in U. S. jurisdiction. Just what it can do with the manifestly fraudulent pre-emption of claims on the beach cannot be determined.

The bill is now before the conference committee of the House and Senate, but further action this session is problematical. The only thing that appears certain is vexatious conflict and ruinous litigation there this season.

DURING the week were held in Denver, Colo., annual meetings of the Western Federation of Miners and the Western Labor Union, the deliberations of each taking an unusually wide scope, the Federation going into the discussion of a resolution to accumulate by assessment a fund with which to purchase mines and establish a co-operative smelter, and the Labor Union appointing a committee to investigate the feasibility of establishing a university wherein could be instructed the sons and daughters of laboring men in political economy. It is not likely that either scheme will meet with immediate practical fruition.

WHEN the astute mine boomer now wants to sell a worthless mining property he "starts" a "mining paper" in Iowa or Illinois, buys a file of some old established mining journal to clip from, and give a "technical" aspect to the production, and in a few weeks announces that he has "the largest circulation of any mining paper in the world." When the mine is unloaded the paper ceases to exist, and the game goes on. The whole thing has the same relation to legitimate mining or legitimate mining journalism that the wrecker's flare along the beach has to the government lighthouse.

INDIAN ENGINEERING figures that the river Hooghly annually discharges 90,000,000 cubic yards alluvium and debris into the sea. Some of the California anti-debris lawyers and "mining engineers" out of a job might be able to start an "anti-debris" association up the Hooghly.

Questions and Answers.

Such questions as the following are usually answered in "Concentrates," the questions themselves being omitted to economize space, and the answer given in smallest possible limit consistent with accuracy and clearness. The following illustrate the scope and character of the questions received from every part of this west half of America, the names of the writers being omitted:

Information is wanted in regard to tungsten—how and where the metal is reduced, the uses and demand, the markets and prices for the ore or concentrates. You will thus benefit an industry in Colorado and the San Juan country, especially, that lies almost dormant. I am producing a concentrate containing 60% to 70% tungstic acid from hubnerite, a tungstate of manganese. One shipment went abroad and brought less than $300 per ton. Other shipments, through New York brokers, brought even less. Efforts have been made to find American buyers, American consumers or even American reducers of the mineral, without avail.

This is my first effort in behalf of the metal and the prospectors and miners of the San Juan to obtain information from the MINING AND SCIENTIFIC PRESS. Here in San Juan county hubnerite occurs in stratified streaks in the veins, true vertical fissures in trachyte. While the veins may be 4 to 8 feet wide, the tungsten streaks are from 4 to 24 inches and cling to one wall or the other, and the tungsten streak has no bases, such as lead and copper, mixed with its quartz gangue which makes up the vein filling, with gold and silver therein, but, wholly free and easily concentrated, the finer the mesh the higher per cent of tungstic acid in the concentrate.

Gladstone, San Juan Co., Colo., April 24.

Hubnerite is also found in considerable quantity in Mammoth and Osceola, Nev.; Ouray and Silverton, Colo.; Lead, S. D., and Dragoon station, Ariz. At the latter place it occurs in white quartz veins, containing little iron, having a manganese oxide base, of brownish-red color, in tabular prismatic blocks or thick plates, completely enclosed in the quartz, and varying in weight from 15 to 500 pounds. A carload of the ore was recently concentrated at the Arizona School of Mines with excellent results. It is a tungsten mineral resembling wolframite in composition, but containing 20% to 25% manganese oxide. The Osceola, Nev., deposit occurs in bladed forms, in color brownish red. It is shipped to Philadelphia, where it is made into tungstic acid, used in the manufacture of steel. It brings $300 per ton laid down in Philadelphia. Its importance is due to its hardness, which is greater than that of any other commercial metal, its high specific gravity—about equal to that gold—and its property of making steel self hardening. So far its sole use in this country is in alloying steel, and the supply exceeds the demand. There is little demand for it in this west half of America. We quote it at 75 cents per pound in New York City and $1 per pound in San Francisco. The manager of the metallurgical department of the Bethlehem Steel Works, Bethlehem, Penna., could give any detailed information required as to prices. It does not cost much to mine, but transportation charges from San Juan county would tend to hinder its profitable production in that region.

A scientific discussion of the subject in connection with steel alloys was published in the issue of Jan. 13, 1900.

Will "Concentrates" please answer the following?

First—What, if any, loss would there be in retorting amalgam in an open crucible?

Second—What effect would babbit have on amalgam if put in a mortar of a stamp mill?

Rochford, South Dakota, May 4.

If amalgam is retorted in an open crucible there will certainly be some loss experienced. The larger the lot, or where there is more of the quicksilver remaining in the amalgam, the more liability to loss, for upon too rapid heating small explosions will occur, blowing out some of the amalgam.

When babbit metal gets into the mortar of a stamp mill, among the ore, it will become ground up and amalgamated with the other fine metals in the ore, the principal effect being to reduce the fineness of the amalgam by such additions of base metals.

I forward you a sample of stibnite running high in antimony. We have a large body in sight. I would like to know where this ore can be handled to the best advantage, what net amount of money can be got for it, etc.

Ritzville, Wash., April 20.

Chapman & Co., 422 Battery street, San Francisco, Cal., or Mathison & Co., New York City, can correctly answer all inquiries regarding value of antimony. Stibnite carrying say 50% antimony ought to be worth $45 per ton f. o. b. at Ritzville.

Tell me through "Concentrates" the best method of separating the fine gold from the black sand. We are preparing to handle Snake river sand.

Lewiston, Idaho, April 28.

Articles innumerable have appeared through the years on this subject. One of the best illustrated notices thereof was published in the issue of May 15, 1897.

I want a good, extended account in detail of how to refine base lead bullion containing silver and gold, something that goes into the thing throughout the entire process.

Leadville, Colo., April 20.

G. H. Blakemore, in charge of one of the largest establishments of that kind in the world, wrote an exhaustive article on that subject, which contains about 14,000 words. It takes the subject up in minutest detail, and appeared in the issues of Nov. 5, 12, 19, 26, Dec. 3, 10 and 17, 1898.

Can water under extreme pressure be forced through rocks, such as granite, quartz and ordinary ore or vein matter? If so, what pressure per square inch does it require to accomplish this purpose?

Burlington, Wash., April 15.

Water has been forced through cast iron cylinders, appearing in minute globules on the surface, but we have no record of similar forcing of water through granite, quartz or ores, and while not deemed wholly impossible such action is not considered feasible.

I would be pleased to learn through your columns of the experience of others in sinking for water through quicksand and boulders. We have tried drilling with machine through a 7-inch casing, but are unable to get through hard boulders loosely bedded in sand. Box cribbing with a good pump that will handle sand seems to promise best. The experience of others in this line would be of great interest.

Ensenada, Lower California, April 10.

Any one able to contribute some practical experience in such case is respectfully proffered space therefor. There are doubtless some readers of the MINING AND SCIENTIFIC PRESS who can supply the desired information.

Tell me in "Concentrates" how a tunnel is ventilated with water. I have understood that water is run into a barrel and an air pipe connected with the barrel.

How can air be compressed by water in a shaft?

Redding, Cal., April 11.

There are several ways. A cheap fashion, effective in a small way, is suggested by our correspondent himself as regards the tunnel, viz., the automatic barrel system of ventilation, which consists of a barrel set in the stream, outside the tunnel, the bottom a few inches below water level and open; a funnel emptying through a 2-inch center into the top of the barrel, and beside the funnel, also inserted into the top of the barrel, the air pipe leading to the tunnel—say 4-inch. By a flume water conveyed to the mouth of the tunnel gathers air in its fall and drives a constant, even current to the breast of the tunnel.

As to the second question, may be instanced a mine at Magog, Quebec, Canada, where air is automatically compressed by a column of water flowing down a pipe in a shaft. The water is received in a tank, from which a vertical pipe descends in a shaft. The air is carried down in this vertical pipe with the water, being drawn through a series of small pipes at the head and carried down in the water in the form of small globules and delivered in the compression tank at the bottom, the compression being produced by the presence of the back column of water, each 27 feet of shaft depth producing one pound of air pressure in the cylinder. The water absorbs from the air the moisture contained in it and delivers the air dryer than the atmosphere, and at the same temperature as the water. A local paper says: "In the plant described 150 air H. P. is produced, and an efficiency of 62% is obtained, so that out of a given theoretic H. P. 62% was delivered at the engines."

Will you kindly inform me if there is a short volumetric test for gold? Prescott & Johnson gives one, but it is long and tedious.

Nederland, Colo., May 6.

We know of nothing reliable for a short volumetric test for gold.

I understand that in some of the California placers an auxiliary plant is installed for the saving of the black sand—magnetite, I presume—which is shipped to the smelters. I have had some very favorable assays returned from black sand samples, and would like to arrange to save mine, if possible. Nothing of the sort has been undertaken in any of the sections where I have worked, so I am at sea how to go ahead, barring some form of concentrator, such as vanner or shaking table, which I am in doubt as to its working on unsized material.

Can you give me a description in "Concentrates" of such a plant or device as is used for the purpose? I find nothing in the various hydraulic machinery catalogues nor in the MINING AND SCIENTIFIC PRESS.

Newsome, Idaho, April 15.

See answer to Lewiston, Idaho, inquirer above.

What is the law or requirement regarding private assays at U. S. Mints? Tell in "Concentrates" if I can I send ore for assay to the U. S. Mint at San Francisco, and, if so, what the charge is and how to go about it?

Bisbee, Ariz., April 28.

These questions from two other sources were briefly answered in the issue of the 21st ult. It may, however, be of general interest to append the following:

Section 20 of general instructions and regulations in relation to the transaction of business at the mints and assay offices of the United States is as follows: "Assaying and chemical analyses of ores and of furnace by-products shall not be performed at the mints and assay offices of the United States, except at the assay office at Charlotte, N. C. The mechanical preparation of pulverizing of ores and other minerals, mattes and slags shall be done upon the premises of the mints and assay offices only when a part of the technical processes of these institutions and in the course of their regular business. Assaying or chemical work in a private professional capacity at the hands of the officers of the U. S. mints and assay offices shall not be performed upon the premises of these institutions. Professional cards and certificates of assay or analysis should be without official captions or signatures. No professional signs shall be displayed upon the premises of mints or assay offices."

The Deadwood, S. D., office was established two years ago; the Director of the U. S. Mint then authorized assays of ores, etc., to be made there the same as at Charlotte, N. C.

If possible, give me through "Concentrates" information in regard to heating capacity of an ordinary Hoskins gasoline burner. I want to use as large a black lead crucible as possible for melting gold bullion—that is, say, size 16 (John Taylor's catalogue)—and would like to know if one burner, in an ordinary assay furnace, could supply heat enough to do the work. Will have to use gasoline; no coke.

Alameda, Cal., May 1.

It will require more heat than the ordinary gasoline assay furnace gives to melt gold in a No. 16 crucible. The No. 11 bullion furnace (gasoline), with Cary burner, will give satisfactory results.

This entire subject received detailed illustrated discussion and description in the issues of July 9 and 16, 1898.

Please state in "Concentrates:" 1. What effect has sulphate of iron on gold amalgam? 2. What would you recommend to procure the most gold amalgam in battery, by soft or hard amalgamating? 3. What would you recommend for one to become a competent assayer—by a correspondence school or by studying books?

Camp McKinney, B. C., May 4.

Sulphate of iron has no effect upon gold amalgam. In forming amalgam in the mortar of a battery, it is best to have it neither very hard nor very soft; if too hard, the gold can not catch; hence, will not save close, and when very soft it is liable to slide off the plates, and much of the amalgam passing out of the mortar to the plates outside, makes liability to loss great.

A correspondence school has its uses; studying books is essential; competent personal instruction and practical skill more so; so much depends upon the man himself; the general knowledge of the art can be learned from study; the "how to do it" best acquired by actual work with a good assayer. There are competent assayers who never read a great deal; but no one ever made a competent assayer of himself or of any one else by study alone.

What is comprised in the north half of the Colville reservation? When will it be thrown open? How can we get a chance?

Republic, Wash., May 5.

The north half Colville Indian reservation will be thrown open at 12 M., local standard time, Oct. 10, 1900. All of it which lies in Okanogan county, Wash., except range 31, will be entered at the land office at Waterville. Range 31 of Okanogan county will be entered at Spokane. In Ferry county make application to the county clerk at Republic or the U. S. commissioner, E. S. Topping. In Stevens county applications will be received by the county clerk and J. Stitzel, commissioner. In Okanogan county the county clerk is at Conconully; there is also a commissioner there and another at Ives Landing. Meanwhile prospectors can go on there now, so a man can go into any of the above offices one minute after 12 noon, Oct. 10th, and swear that he has been over each and every legal subdivision of a quarter section and make formal application.

Kindly state in the column of "Concentrates" the kinds of metals and the amounts of each that constitute the alloy called stereotype metal.

Silverton, B. C., May 9.

The following formula is furnished by our stereotyper: Lead, 78; antimony, 12; tin, 10. This is an average proportion. There should be one part bismuth, but its price is so high it is seldom used. For special work requiring extra wear 3% to 5% more of antimony is added in place of lead.

I have a General Electric dynamo of 10 volts and 150 amperes; it was made especially for precipitation of metals in solution. Please let me know in answers in "Concentrates" if this dynamo can be used for lighting purposes. If so, what number of lights it would give and what, if any changes, would have to be made?

Cherry Creek, Nev., May 12.

The machine which our Nevada correspondent has would not be satisfactory for incandescent lighting, and to make it satisfactory for this purpose it would have to be entirely rewound, which would probably cost as much as to get a new machine.

Kindly let me know the address of some one in California who has invented a foot power wood-sawing apparatus for sawing wood for domestic purposes. I have not been able to get a favorable reply from Eastern firms; they tell me they only carry foot power sawing machines for carpenters' use.

Stonewall, Colo., May 5.

What effect has sea water upon amalgamation of gold on silver-plated copper plates? Give precautions necessary to keep such plates in good condition. If verdigris appears on the plates while using sea water, what had best be done?

Is the U. S. Seattle Assay Office permitted to make assays and analyses of ores and other products?

Oakland, Cal., April 30.

Sea water has no apparent effect upon the amal-

gamation of gold upon silver-plated copper plates. If the plates tarnish much, use either potassium cyanide or sodium amalgam in the battery mortar or upon the plates; this, together with frequent rubbing of the plates with a small addition of quicksilver to the spotted portions, will soon overcome the difficulty.

The rules and regulations which govern the U. S. mints and assay offices clearly state that assaying and chemical analyses of ores and furnace products shall not be performed at the mints and assay offices of the United States except at the assay offices at Charlotte, N. C., and Deadwood, S. D. See answer to Bisbee, Ariz., inquirer above.

I wish a description of the process of manufacture of mineral wool from slag, or molten material by the use of the air blast.

Morenci, Ariz., May 2.

The Mineralized Wool Co., 18 Vesey St., New York City, can supply the desired information.

I would like to know where to find details of the latest method of producing caustic soda from brine and saving the chlorine.

Riverside, Cal., May 10.

Matheson & Co., Newark, N. J., or the Solway Process Co., Syracuse, N. Y., can furnish full details of the process.

Where tailings or debris have been deposited behind and are held back by a dam constructed in early days for reservoir purposes, can the debris so deposited behind the dam be elevated and flumed into the stream below the dam? Or can a tunnel be run around the edge of the dam, but still in channel of the river, debris to be taken through tunnel to stream below and there sluiced.

Auburn, Cal., May 10.

Not legally.

During the month of June, 1899, I located six mining claims in Shasta county, Cal. I had all the lines marked out and necessary monuments erected and recorded in the county recorder's office and went to considerable expense. About two days after the publication of an article by Mr. Ricketts, two of the best claims were jumped. To comply with the U. S. mining law, it would be necessary for me to spend $600 on these claims this year, which I do not care to do, taking chances on throwing it away through the mistakes of a miserable set of legislators, who do nothing but pass useless laws and then try to repeal them. Do you think my title will be good in U. S. Court if I comply with U. S. mining laws?

Rosemont, Ariz., April 7.

Yes. In such cases manifest intent and the good faith of the locator are largely taken into account, and courts have uniformly ruled that where it was manifestly the intent of the locator to comply with all legal requirements, no court would incline to the enforcement of forfeiture where the locator has shown such effort to faithfully observe the legal requirements, as our Arizona correspondent claims to have done in Shasta county, Cal.

Can you refer me through "Concentrates" to former issues of your paper, or elsewhere, that will give me details of converter treatment of copper matte as practiced at the Parrott Smelter, Butte, Mont.?

Leadville, Colo., April 23.

The latest direct reference to the Parrott Smelter in this paper was in the issue of September 4, 1897. An inquiry directed Chas. Bartine, care Standard, Anaconda, Mont., would doubtless elicit the desired information. The best and latest treatise thereon is the address or paper read before the Institution of Mining and Metallurgy last October by Prof. James Douglas. It has been issued in handsome form by Fraser & Chalmers, and a request for it addressed to them, Twelfth St. and Washtenaw Ave., Chicago, would doubtless procure it. It is entitled "Treatment of Copper Mattes in the Bessemer Converter," and is a valuable addition to metallurgical literature. The article, in condensed form, is now appearing in these columns. (See page 552.)

A has a tank 8 feet square, 11-inch pipe and 3-foot goer and 4-inch nozzle under 150-foot pressure, and water fills the tank under that pressure. B claims that a tank built 8 feet higher will derive more pressure with tank full of water. Which is right, A or B?

Sierra City, Cal., April 20.

If the nozzle is under 150-foot pressure the increase in height of tank would increase pressure in proportion to added height of tank, provided higher tank is full. The question is not entirely clear.

Kindly inform me whom I can correspond with regarding molybdenite, as I am the possessor of a claim of this mineral, but have been unable to find any one who is able to tell me anything about it.

Kennett, Cal., April 29.

Full information on this point was given on page 205 in the issue of Feb. 24, 1900.

Will "Concentrates" please give a method to determine if rock carries gold by the use of either nitric or muriatic acid, and is there any way to ascertain if rock carries silver by the use of the same acids. Sometimes a prospector finds himself 50 miles away from an assayer and it would be a great saving of time if he could have a method by which he could approximately judge value of rock in regard to gold and silver.

Kingman, Arizona, April 28.

To test quartz for the presence of both gold and silver by the use of nitric or muriatic acid, the ore should be reduced to a powder sufficiently fine to pass through a No. 60 sieve. Place this pulp, when screened, in some flat iron vessel over a fire, so as to burn out those elements which readily sublime or burn. The pulp, when cool, should be placed in a glass vessel and covered with nitric acid, pure or slightly diluted with water. To facilitate the action of the acid, the vessel containing the acid and pulp should be set in a pan partially filled with sand; then heat the pan. The sand will prevent the glass vessel from bursting by rapid expansion. As soon as the acid begins to boil set it off the fire and let remain standing for several hours. Add about as much again water as there is acid and pulp, then shake or stir thoroughly and filter off the liquid. The liquid thus obtained is a solution of the nitrates of all the metals that the rock contained and that are soluble in nitric acid. Add drop by drop a strong solution of common salt. If a white precipitate appears after adding the salt, it is either oxychloride of bismuth, mercurous chloride (calomel, a salt of quicksilver), or chloride of silver. To tell to which of these three classes the salt belongs, pour off the fluid above; if it dissolves it is bismuth, and neither silver nor quicksilver. If it does not dissolve pour off the acid and to the precipitate add strong ammonia. If the precipitate dissolves the salt, it is silver chloride. If it does not dissolve, it is quicksilver chloride or calomel. To the dried silver chloride add an equal amount of washing soda or borax, then it can be melted to a "button" of bullion.

As to the gold, take the pulp and filter saved from the first part of the experiment and put into a crucible and heat. The filter will completely burn. Next put the pulp through a very fine screen. Now soak for two days in an acid consisting of a mixture of four parts nitric and fifteen parts muriatic acid, which has been prepared at least two weeks before. This will convert any gold present into a perchloride of gold. Platinum will also be converted into a perchloride. Again filter; take the liquid that filters through and evaporate to dryness, either in a porcelain dish or glass flask in the sand, as before described. This is done to remove the acid. Dissolve the dry residue in water, simply by adding warm water to the flask as soon as it is sufficiently cool not to burst when adding the water. When the salt which remained in the flask after evaporating is thoroughly dissolved again, add a solution of ferrous sulphate (copperas) or of oxalic acid and set aside. Let stand for two or three days. A fine brown powder precipitated to the bottom of the flask is pure powdered gold. Pour off the liquid above the powder, wash thoroughly and dry. These precipitates may be melted into a gold button, but it requires great heat.

The following is a simple test for gold which may fill our correspondent's ordinary requirements so far as gold is concerned: For gold in oxidized ores, pulverize the sample and place in a porcelain lined vessel or tea cup, cover with iodine and allow it to stand for two or three hours. Then dip into it a piece of white filter paper, dry and burn it, and if it gives a purple color gold is present, and the deeper the purple the richer the ore. For other ores with this test, such as pyrites, the ore must be roasted. Where lime is present the ore must be roasted twice, the second time adding carbonate of ammonia. After roasting, test as with oxidized ores.

I wish you would have "Concentrates" answer the following questions: Can parties cut timber off from a mining claim, owned by other parties, for fire use, the claim being located according to the U. S. mining laws and recorded? Can one person locate more than one claim on the same lode adjoining one another?

Graniteville, Cal., April 30.

No one other than the locator can legally cut or remove timber from any unpatented mining claim even with the locator's consent; nor has the locator himself any right to the timber on his unpatented location, except for mining purposes on that claim.

Answering the second question, the only limit to the number of locations any one can make and hold is his ability to do the required annual assessment work thereon.

I wish you would favor me with some information of the "electro-peroxide" or "peroxygen" process. Am interested in experimental work relating to cyanide, but have seen no mention of any such process in your paper, though I understand it is in use.

Prescott, Ariz., April 28.

Any one having practical knowledge of the process would confer a favor by sending some brief data relating thereto.

How many simple elementary substances are there? What do you define an "elementary substance" to be? Name them, please.

Silverton, Colo., May 1.

An elementary substance is one from which nothing different from itself can be extracted. The chemical elements as at present known are seventy-four in number, as follows: Hydrogen, lithium, sodium, potassium, rubidium, cæsium, glucinum, magnesium, calcium, zinc, strontium, cadium, barium, mercury, boron, aluminum, scandium, gallium, yttrium, indium, lanthanum, neodymium, praseodymium, samarium, gadolinium, terbium, erbium, thulium, ytterbium, thallium, carbon, silicon, titanium, germanium, zirconium, tin, cerium, lead, thorium, nitrogen, phosphorus, vanadium, arsenic, columbium, antimony, tantalum, bismuth, oxygen, sulphur, chromium, selenium, molybdenum, tellurium, tungsten, uranium, fluorine, chlorine, manganese, bromine, ruthenium, iodine, osmium, iron, nickel, cobalt, copper, rhodium, palladium, silver, iridium, platinum, gold, argon, helium.

If eight persons locate a placer mining claim jointly, containing 160 acres, and seven of the joint locators subsequently deed all their interest to the one remaining joint owner, can he secure a U. S. patent to the whole 160-acre tract?

If all eight of the joint original locators deed all their interest to a stranger, can he secure a U. S. patent to the whole 160-acre tract?

Can any one person, at the same time, own, as above, several 160-acre tracts and secure U. S. patents for them?

Prescott, Ariz., May 3.

The Act of July 9, 1870, gave individuals or associations the right to take up 160 acres placer ground. This was superseded by the Act of May 10, 1872, which restricted individual placer locations to twenty acres. Where more than one person—not exceeding eight—join in locating placer ground, they locate the whole area jointly. Discovery need not be shown, Secretary Bliss having ruled that "when a placer location is made by an association, one discovery is sufficient."

On each twenty acres the equivalent of $500 in work or improvement for each twenty acres, or fraction of twenty acres, of the entire tract must be done before the locators are entitled to patent. "Lindley on Mines" says:

It is a matter of frequent occurrence that an individual locator, desiring to obtain more ground than he is permitted under the law to appropriate in his individual capacity by a single location, resorts to the use of "dummies," and perfects locations in their names, subsequently obtaining conveyances therefor. The courts have held that this is a fraud upon the Government. The same object can be accomplished without violating the law. There is nothing to prevent a miner from locating, by separate location, as many twenty-acre tracts as he pleases, either contiguous or non-contiguous. The right to locate and develop mining ground is not exhausted by a single location, as in the case of pre-emption and homestead entries. If he can discover mineral within the eight twenty-acre subdivisions of a quarter section of land, and is willing to develop them to the extent required by law as a condition precedent to the acquisition of title by patent, or to annually perform labor to the extent required by law upon, or for the benefit of, each, he is clearly entitled to do so. The statute simply inhibits the acquisition by an individual of more than twenty acres by a single location. During the period when rights were governed exclusively by local rules, in certain districts the number of claims which one might locate and hold at one time within that particular district were defined. But there is no trace of this found in the legislation of Congress.

This indirectly answers all three questions.

I want to know about Contreras Camp, seven miles from Jackson, Amador county, Cal. What is the formation? What is the character of the leads? What is their general width and value? Is there plenty of wood and water? What is being done in the camp?

Box 48, Altman, Colo., May 4.

Any one in the locality named able and willing to furnish the desired information can have sufficient space herein to make known the mineral resources of the vicinity.

I have a low-grade copper ore that I want to leach. It is too siliceous to admit of smelting. Give me some points as to what is best to do. Do you know of any concern successfully treating ore in that way? Please answer in "Concentrates," but don't publish my name, as I don't want to be swamped by a flood of pamphlets and proffers.

The above from a Nevada inquirer indicates a mistaken notion. Unless specially asked to be inserted, the name of an inquirer is not published, though the location is usually given. In this case it would serve our Nevada inquirer very well to have his name and address appear, for the "flood of pamphlets and proffers" that might follow the appearance of his address in these columns is evidently what he needs, though, as evidently, not what he wants. Men skilled in the commercial requirements of the situation could readily furnish him with "points," and it is the commercial side of the question that would probably be of most interest to him. However, his request for privacy will be respected. As to the first question, he might write to the Santa Rita Co., Santa Rita, N. M., who appear to have successful solution of the question. A letter addressed to the manager of the Black Warrior Copper Co., Globe, Arizona, might also bring some practical points. There are so many attendant circumstances that unless one knows all about the case it is difficult to give other than general outlines of possibilities.

A low-grade copper ore can be leached; the commercial results may not be wholly satisfactory. If there are large quantities of ore and one has money, he may make a commercial success. The process itself does not offer many great difficulties. The copper must be transformed into a sulphate, if water is to be had cheap enough. If sulphuric acid can be used, a simple oxidizing roasting will bring the cop-

per to a condition where it will dissolve in diluted sulphuric acid. If the copper in the ore is a carbonate, the roasting, of course, can be omitted in the acid leaching. It is a common practice in such case to pile the ore, allowing the rain and air to oxidize the copper sulphides, forming copper sulphate, which water will extract from the ores; but this is a very tedious process, involving a long wait for returns. There is an electrolytic treatment to leach copper ore carrying a little gold. The ore carrying a little gold and copper can be leached with a hot solution of cupric chloride in a rotating barrel, through which a slow alternating current of electricity is passed. This cupric chloride solution is prepared with a saturated solution of calcium or magnesium, chloride or salt, so that the combined chemical and electrical action extracts all the copper from the ore. The clear solution is run through a barrel containing copper oxides or hydrates, which will remove all the iron and similar impurities from the solution, leaving in it only pure copper. This solution is then passed into rectangular vats containing porous asbestos partitions with electrodes for conveying the current to the solution as it passes in the vats. As the copper is deposited the solution is pumped back to a reservoir for further use, this being made to last indefinitely, a little water being added to make up for evaporation and a little chemical to supply losses by leakage. The ore being freed from copper is then in condition for cyaniding. So far as known, however, the above described process has not been tried on a scale that would entitle it to endorsement from a commercial standpoint. Carbonate copper ore can be leached with sulphuric acid and deposition by electrolysis. A generator of 100 amperes, through a series of 320 vats or plates, will, theoretically, deposit 2000 pounds of copper per twenty-four hours from a sulphate solution and nearly 4000 pounds from chloride solution. The per cent of bluestone is proportionate to the increase or decrease of surface; with 8% it would be about 10 feet. Where sulphate is used and insoluble anodes, lead or carbon would do for the anodes. The vats in such case should be small, so that the slimes deposited from aeration of the solution could be easily cleaned out without disturbing too much of the series. A convenient size would be 4 feet square on each end and from 5 to 8 feet in length if a simple series is used, or 15 feet if tandem series; anodes 36x40, or with common series can be composed of smaller pieces. With such plate service the generator should have about 125 voltage.

The introduction of mining dredging has created new interest in the gravel deposits of the State and there are many men to whom it would be of interest to read in your pages how to go to work to amalgamate the gold in a sample of gravel so as to form a reasonably close estimate of its value. Of course, to assay an ore is a task for a scientific man, but to learn the value of the amalgamable gold in a gravel should not be a very complicated business.

San Francisco, May 8.

Can "Concentrates" inform me what wolframite looks like? What is the value of it per ton, and where is it used?

Gold Hill, El Dorado Co., Cal., May 5.

It is generally brownish or grayish black, with reddish brown streak; specific gravity, 7.3; occurs crystallized; is found in considerable quantities in many places. It is used to improve the quality of steel. Shipments are now made from Osceola, Nev., where wolframite ore is found carrying 66%. The consumption of wolframite in the United States in 1899 was 100 tons. See answer to Gladstone, Colo., inquirer at head of these "queries and answers."

State in "Concentrates" if a mining location can be made on a claim which has been previously located and staked, but has run out, using original boundary lines and monuments to define second location? Also, can a mining claim be located and held indefinitely without being recorded?

Junction City, Cal., May 6.

If a claim is actually abandoned, the ground is open to relocation in the same manner as though no location of the same had ever been made; but in such case as that cited it is extremely necessary for the intending relocator to be sure that he is right before going ahead. Answering the second question: in California, to be legal, a certificate of location must be filed with the county recorder.

Kindly advise through "Concentrates" which is the right way to proceed for a Cape Nome miner, since the Hansbrough amendment (Sec. 73) has been shelved in Washington, D. C. An alien located and held a claim through influences at Nome. The claim was relocated and recorded by an American citizen March 11, 1899. (1) This year the $100 yearly assessment work should be done. (2) How and the right way to proceed to stop the party from working and quit same if he is not entitled to the claim. This is a Federal question, as you state on page 370, April 7, 1900.

San Francisco, May 12.

The exact law in the case and answer to such inquiry was given in a column editorial on page 458, of the issue of April 28, 1900.

As a subscriber to your paper I shall be obliged if you will tell me the number of the canvas usually used in a canvas plant.

Bodie, Cal., May 9.

In the Gates, No. 8, 96 inches wide, is most generally used.

The Atlin Gold Fields of British Columbia.

Written for the MINING AND SCIENTIFIC PRESS by J. H. BROWNLEE, Provincial Land Surveyor.

The Atlin mining district is situated in the northwest corner, so to speak, of the Province of British Columbia, and is approached from Skaguay, Alaska, the latter being in touch with all the cities of the Pacific coast. From Skaguay to Atlin the journey is an easy one; first, for 50 miles over the narrow-gauge railway of the Yukon & White Pass Co. to Bennett, a small town at the southern extremity of Bennett lake; thence easterly another 70 or 80 miles by lake steamers to Atlin town, which nestles in a snug harbor on the east shore of Atlin lake. At present continuity of navigation to Atlin is broken for a distance of two miles. This is between Atlin lake and Taku Arm, and the portage is equipped with a tramway, having wharves at both ends. During the season of navigation, say, from May until November, the trip between Atlin and Skaguay is made in one day. In winter it takes at most two days over the ice from Log Cabin, a station on the Yukon & White Pass railway to Atlin.

The Atlin mining district extends from the Dalton trail, west of the Chilcat river, easterly through about four degrees of longitude, or a width of about 140 miles, to the watershed between Surprise and Gladys lakes. The northern boundary is the recently demarcated 60th parallel of north latitude. The southern limit is that much disputed irregular line between the United States and Canada. Within this extensive range of country there is in the aggregate a large area of lakes whose waters drain indirectly into the Yukon river, and which afford an easy means of getting about the country. The principal lakes of the district are Atlin, Bennett and Taku Arm. These are long, narrow stretches of water, lying over 2000 feet above sea level, and in a direction north and south, being parallel to each other.

It may be said that the Atlin placer diggings were discovered in the summer of 1898, although it had been known for years to old Cassiar miners that a few big lakes, of which the largest was called Atlin, lay in the northwestern part of the Cassiar district "amidst rugged hills and massive glaciers."

The first "claim" in the new El Dorado was staked by Fritz Miller and Kenneth MacLaren, hailing from Juneau, Alaska. Miller is a German and MacLaren a Canadian. These hardy and intelligent prospectors were guided by the crude sketch and description of a third partner at Juneau.

Branching off the main trail somewhere near Bennett, these two men traveled on the ice and across country to Atlin lake, and, after much wandering and some hardships, found satisfactory diggings on Pine creek and staked Discovery, where Pine City now stands, about 6 miles from the mouth of the creek. The news of the Miller–MacLaren strike soon got out, and a few good, more bad, and many indifferent placer miners followed last year, with varying fortune, as is usual in all new mining camps.



Pine Creek, Atlin, B. C.

The discoverers of Pine creek have been rewarded by taking out upwards of $40,000 from the creek bed alone in a length of about 800 feet. The benches are still unworked.

The winter climate of this country is not more severe than Dakota or Manitoba, if it is as cold. I can not better describe the scenic attractions of this region than by quoting from the report of the district, written for the Department of Mines at Victoria by R. C. Lowry, C. E., who, like the writer, has wintered in these parts, and is therefore not carried away by any "picnic" notions:



Pine Creek, Above Discovery, Atlin, B. C.

"To the natural beauties of this Atlin country it would be impossible for even the most apt pen to do justice. A combination of every feature that renders the most lovely landscape attractive, with a variety and scope of coloring unique in itself, is seen on every side in the ever-changing light of our glorious summer days. And from September, when the first tints of autumn gild the poplars and the birches, until

'The shadow of the winter's on the year,'

the rapid transformations, the kaleidoscopic changes,

* See illustrations on front page.

make us marvel while we revel in the glories of fair Atlin."

A profusion of wild flowers abound, and small fruits, such as strawberries and red currants, grow wild in some parts.

It must be admitted that this country is not a sportsman's paradise. There are moose, cariboo, big horn goats and even bear, but for the most part the few Indians in the neighborhood get the big game. As a rule, good miners and prospectors are not looking for that particular kind of game. There is plenty of white fish and trout to be had with less trouble



Willow Creek, Atlin, B. C.

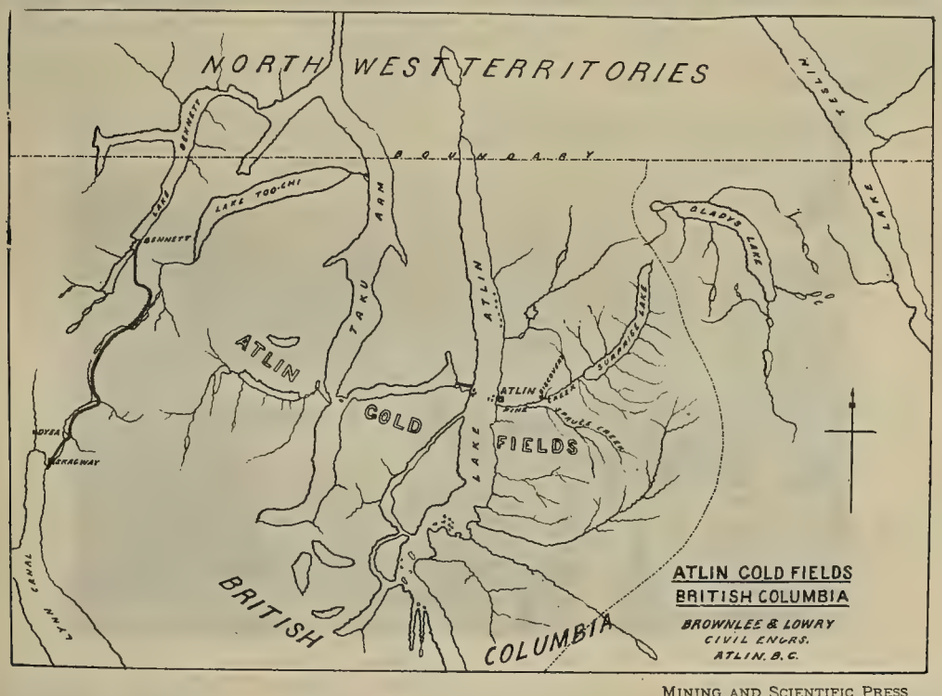
all the year round; ducks are plentiful in season, and ptarmigan and grouse make good winter sport. A satisfactory feature of this country, interesting to prospectors, is the comparative freedom from mosquitoes and insect pests.

Of paramount importance is the timber supply; this consists mostly of jack pine and spruce, averaging about 1½ feet in diameter. Considerable inroads have been made on forests near Atlin and along the creeks that were worked last year. It is fortunate that the country has not suffered of late years from forest fires. There appears to be a sufficient supply of timber in close proximity for hydraulic operations and mining purposes for some years at least. The price of sawed lumber ranges from $50 to $80 per M feet, depending upon the locality. There are three sawmills at Atlin and also, it may be mentioned incidentally, three chartered banks, all having business premises of their own.

Again quoting from Mr. Lowry's report, or what he is pleased to term "a mere sketch of prevailing conditions:"

"The geological formation of the district is already under examination by the distinguished department of the Dominion Government in charge of such scientific work. The formation is very interesting, there being many well marked contacts. East of Atlin lake as far as Surprise lake the formation appears to be diorite; beyond this gneiss predominates. At the south end of the lake sandstone of uncertain age prevails, and basalt is to be seen here as well as in other parts of the district. Southwest of Atlin City, on Goat island, there is a large mountain of syenite. Outcrops of limestone have been found.

"Cutting through the diorite in the bed of Pine creek, for instance, veins of quartzite as much as 6 feet wide, showing free gold, have been uncovered; and there are, e. g., in the vicinity of Atlin city extensive "blowouts" of the same class of rock which assay well. The thorough examination which the last-mentioned ore bodies are now undergoing at the hands of Lord Ernest Hamilton's company will demonstrate their worth; and if the apparently well-justified expectations of this company are realized the future of the Atlin camp is assured. Put briefly, the indications are that there are large bodies of low-grade ore susceptible of easy manipulation and which are largely free milling or amenable to a cheap process for the extraction of gold. The whole country has been under glacial action in relatively recent times. Indeed, a considerable portion of it is even now covered by glaciers, of which the principal one is known as 'Norna' or 'Llewellyn,' and lies in a line approximately northwest and southeast to the south of Atlin lake and Taku Arm, extending over a length of some 40 miles."



MINING AND SCIENTIFIC PRESS

The principal quartz locations were made last summer, consequently only a limited amount of prospecting has been done. Many specimens of free milling ore run high in gold, and this summer will see active prospecting and a more rapid development of the young camp than the alluvial diggings alone would warrant.

With reference to the inducements which this district holds out for hydraulic mining on a large scale, it may be truly said that they are well worthy of the attention of practical miners and engineers who are in touch with capitalists willing to investigate the opportunities at hand. All the physical conditions appear to be very favorable. The larger and lower-lying lakes afford a practically unlimited dumping ground. There are no hampering influences about debris, or agricultural interests to interfere with the proper working of the mines. Sufficient water is to be had on most of the creeks during the working season, which lasts for four months. There are, in many places, smaller lakes, at a high level, suitable for reservoirs, and in some cases economical conserving dams may be constructed on the smaller creeks or smaller feeders. The topography and hydrographic features of the country at once mark the district as being one eminently suited for hydraulic mining on a large scale.

The origin of the extensive gravel benches, sometimes on one side and more often on both sides of the principal creeks of the district, does not appear to be settled. The deposits are probably due to combined glacial and fluvial action.

The point of material interest, however, is the fact that these immense benches of gravel are auriferous and in some places are very rich. More or less gold has been found on every creek that has been prospected.

Most of the valleys are narrow and deep, with tiers of gravel benches or terraces. Occasionally there are cut banks 100 to 200 feet high. There is hardly a creek in the district that has not one or more canyons that may be utilized for controlling the water supply and for power purposes.

The fall of the creeks varies from 40 to 400 feet to the mile. Reverting to the all-important matter of gold production (for all the above noted advantages and attractions are as naught if the yellow metal is not here in paying quantities), it may be stated that there was from $1,200,000 to $1,500,000 taken out of the creeks and first benches last year by the most primitive methods of working, there not being a hydraulic plant worthy of the name in the camp last season.

Royalty was paid to the Provincial Government on $404,387. The banks at Atlin alone purchased more than this amount of gold, to say nothing of the many sacks that were taken out on which no royalty was paid. It is estimated by the merchants of Atlin that royalty was not paid on more than one-third of the output, which accounts for the difference between the official figures and the above estimate.

If any flour gold came out of the ground last year it is still in the dumps. Experienced placer miners have told the writer that there was a great loss caused by lack of practical mining knowledge.

Considerable work in drifting and sinking is being done on the first benches and on some old channels, giving results in many instances that will insure plants being installed this season. A few companies are preparing to hydraulic this year, and there are openings for more.

The benches are acquired by lease of eighty acres for twenty years from the Provincial Government at an annual rental of $50. A reasonable expendure annually developing the property is a condition of the lease.

Abandoned creek diggings are also leased in the same way at an annual rental of $75. Creek bed leases are half a mile in length. That the acquirement of "abandoned creek diggings" would prove a paying proposition may be readily understood by referring to the following extract from Mr. Lowry's report:

"The past summer a great deal of work, much of it unintelligently approached, has been done by individual miners on 100-foot claims, working the creek beds. Some of these men have made money at the work, but it is doubtful if the larger portion of them made wages. In this Atlin country, at least, it is a fact that these 100-foot placer claims have proved to be a delusion and a snare. Argument in support of the above statement would be too lengthy to embody in what purports to be a mere sketch of prevailing conditions, but corroboration of the fact will be forthcoming on all sides.

"These same creek beds cannot, for the most part, be worked by the 100-foot claim holder owing to the great depth of gravel on the bedrock. To deal with the conditions economically hydraulic methods, including in places the use of elevators, will have to be resorted to. Intelligent mining in this way will be richly rewarded."

It is the writer's opinion that for six months of the year prospecting may be carried on in this Atlin region with fairer prospects of success, and with less physical hardships, than in any new mining camp in America.

The dry, temperate summer climate is unsurpassed for enjoying out-of-door life. Pack animals thrive on the luxuriant bunch grass. Ponies and burros are cheap and may be utilized everywhere in the interior. Again, kind nature could not have better planned the waterways to help out the plucky searcher for gold-bearing rock or for rich alluvials.

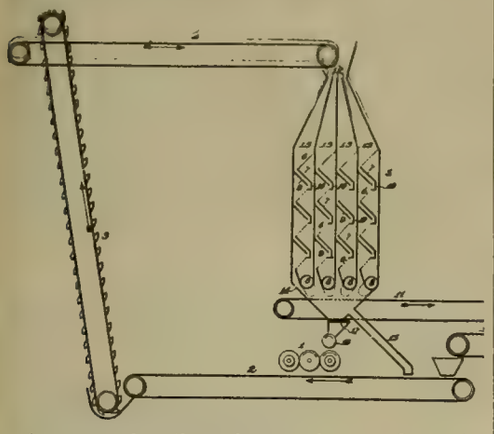
[The engravings on this and preceding pages of scenes in the Atlin district are from photos furnished by Mr. A. C. Hirschfeld. Since Mr. Brownlee wrote the above article the Provincial Legislature has repealed the law excluding aliens from the placer fields of Atlin district.]

Mining and Metallurgical Patents.

Patents Issued May 8, 1900.

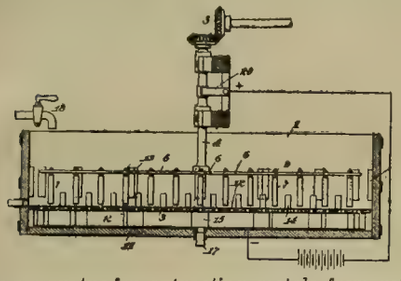
Specially Reported for the MINING AND SCIENTIFIC PRESS.

PROCESS OF SCREENING OR SIZING VERY FINE MATERIALS.—No. 648,934; T. A. Edison, Llewellyn Park, N. J.



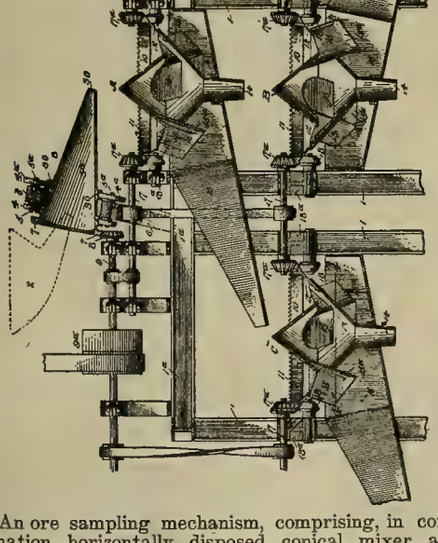
A process of continuously screening very fine material, which consists in maintaining in movement a practically constant load of a very much larger material than the material to be screened out, in deflecting and grinding portion of such coarse material, in adding ground portion to moving stream of coarse material, in subjecting mixed coarse and ground material to screening operation, in removing fine screenings, and in supplying to stream of coarse material an additional amount of coarse material to compensate for removed screenings.

APPARATUS FOR EXTRACTING METALS FROM REFRACTORY ORES.—No. 649,151; W. Wright, New York, N. Y.



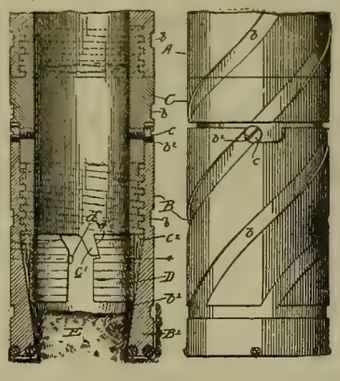
An apparatus for extracting metals from refractory ores comprising tank for receiving a sludge of such ores, stationary, horizontal, perforated partition in tank, forming beneath it a chamber, cathode on bottom of tank within chamber, filtering medium carried on partition, a number of pins arranged in series of concentric circles projecting upward from partition, main driving shaft, plurality of anodes carried by shaft and working between series of concentric pins, and plurality of dash plates carried by side of tank above partition.

ORE SAMPLING MACHINE.—No. 649,288; H. D. Fanders, Leadville, Colo.



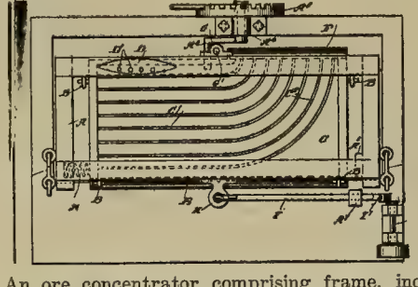
An ore sampling mechanism, comprising, in combination, horizontally disposed conical mixer and feeder having discharge opening in its apex end; suitable supporting rim; receiving hopper comprising an inverted conical body, having a central pendent discharge 14; an annular gear rim 11, fixedly connected to upper end of hopper; guide rolls 18, for rim; means for rotating hopper and receiver; collecting trough 16, disposed under receiver, receiver having its discharge 14, projected down through bottom of trough, conical bottom member 10, having its apex disposed directly under discharge end of hopper, bottom of member 10, being of less diameter than adjacent walls of receiving hopper; a series of equispaced division plates 15, fixedly connecting bottom 10, to receiving hopper, pockets 15, projecting through side walls of receiver hopper and discharging in collecting trough 16.

CORE BREAKER AND LIFTER FOR ROCK DRILLS.—No. 648,920; M. C. Bullock, Chicago, Ill.; M. A. Bullock, executrix of said M. C. Bullock, deceased, assignor to M. A. Bullock.



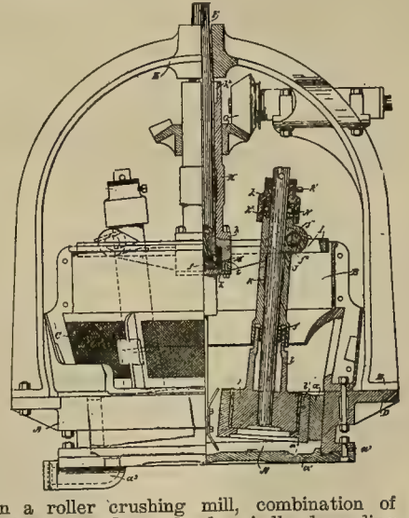
Combination with tubular drill rod, cutting head moveable with respect to drill rod and provided with an inclined interior surface, a split or open core gripping ring engaging inclined surface, a stop on cutting head engaging end of split ring, and interlocking means on drill rod and other end of ring whereby ring is held expanded and out of contact with core during normal operation of cutting head and is allowed to contract upon core when cutting head is not in action.

CONCENTRATOR.—No. 649,275; E. F. Davis, Wetmore, Colo.



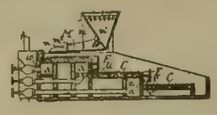
An ore concentrator comprising frame, inclined table hung in frame and pivoted thereon, means for imparting bumping reciprocating motion to table, feed hopper for discharging material upon table at upper end thereof and at one side, riffles on table extending partly straight in longitudinal direction below feed hopper and partly curved in an upward and transverse direction, trough on lower front end of table for receiving tailings, and trough on upper rear end of table at discharge end of curved parts of riffles for receiving gold.

ROLLER CRUSHING MILL.—No. 648,960; F. A. Huntington, Oakland, Cal.



In a roller crushing mill, combination of pan, bracket above pan, fixed spindle depending from bracket over pan having on its lower end a fixed collar, sleeve having an extended bearing on and mounted rotatably upon spindle, extending below end of spindle and bottom plate on lower end of sleeve, driver carried by sleeve, ball bearing through which sleeve and driver are supported by fixed collar of spindle, bottom plate under hub and collar and secured to sleeve whereby confined chamber for oil is provided, and roller carried by driver and operating within pan.

ORE CONCENTRATOR.—No. 648,908; F. L. Bartlett, Canyon, Colo.



Combination in an ore concentrator of a laterally inclined and longitudinally reciprocating shaking table having longitudinal riffles, a grading or separating feed box, ducts or spouts leading from feed box for delivering several grades of ore along upper edge of table and water supply means extending along upper edge of table outside of line of delivery of ore.

Quartz Thermometers.

It is well known that quartz becomes pasty before it melts, and M. A. Dufour has therefore tried to work it like ordinary glass. The point at which it begins to soften is between 1000° and 1200°—the temperature of the interior of the oxy-hydrogen blowpipe flame. The working of quartz has shown itself to be perfectly feasible, says the Electrician, and it may become an important substance where a highly refractory body is required which has a definite chemical constitution, is not hygrometric, can not be oxidized and can not easily be reduced. Besides, it always remains transparent, and does not, like glass, evolve gases on melting. The author's first application was to thermometry. He constructed a thermometer tube of quartz and filled it with tin. It worked very well between 240° and 580°. The walls of the bulb had to be thick, as the solidifying tin otherwise pulled them together. The author is now making quartz vacuum tubes, which may possibly not occlude gases in their walls. It would then be possible to test the question as to what is the actual vehicle of vacuum discharges. The Electrical Review thinks that perhaps there is also an opening for incandescent lamps made of quartz.

Petroleum Product in California for 1899.

Mr. Chas. G. Yale, Statistician State Mining Bureau, furnishes the following data of the petroleum production of certain California counties for the year 1899:

	Barrels.	Value.
Fresno	439,372	$439,372
Kern	15,000	13,500
Los Angeles	1,409,356	1,409,356
Orange	108,077	108,077
Santa Barbara	208,370	191,288
Santa Clara	1,500	3,000
Ventura	496,200	496,200
Totals	2,677,875	$2,660,793

THE gun that will shoot 20.76 miles has been successfully jacketed at the U. S. Arsenal, Watervliet, N. Y., and will now progress to completion. It will be the most powerful piece of ordnance in the world, and will weigh, without the carriage, 126 tons. Its length will be 49 feet 6 inches; the diameter of the breech, 6 feet 2 inches; the size of the bore, 16 inches. Theoretical range of the piece will be 20.76 miles; weight of projectile, 2370 pounds. The projectile intended for the big gun is 64 inches long, and the powder charge consists of 1060 pounds. The powder will cost $265 and the projectile $600, so that the cost of every discharge, exclusive of wear and tear on the gun and the pay of people employed in its manipulations, will be $865. The projectile, with its initial velocity of 2600 feet a second, will penetrate wrought iron to the depth of 41.6 inches. To attain its maximum range the projectile will reach an elevation of five miles, and the pressure on the gun at the time of its discharge will be 36,000 pounds to the square inch.

CONSERVATIVE OIL MEN say that the value of an oil well is about three times its net earning power in one year. The earning power of a well is about two barrels per day less than the gross output, the value of a well to be measured on the ground. Thus the earning power of a 5-barrel well would be about 1080 barrels per year, valued at the present time at about $972, making the well worth $2915. A 10-barrel well would produce, net, in a year 2880 barrels, worth $2592, making the well worth $7776. A 20-barrel well would produce, net, about 6480 barrels in a year, valued at $5832, making the well worth $17,496. A 50-barrel well would produce, net, in a year 17,280 barrels, worth $15,552, making the well worth $46,656. A 100-barrel well would produce, net, in a year 35,280 barrels, worth $31,752, making the well worth $95,256.—Los Angeles, Cal., Herald.

Treatment of Copper Mattes in the Bessemer Converter.*

NUMBER II.

To hasten removal between the converter stands and relining platform, cars propelled by an electric motor are being introduced. Not less than three shells to each stand should be provided if the objectionable practice of cooling the exhausted lining by a stream of water is to be avoided. Four shells per stand should be provided if the matte treated is low and relining has to be very frequently resorted to.

The finished copper is generally poured from the converter into steel moulds ranged side by side on a long car, but moulds of crude copper cast from the converter are sometimes used. The moulds held from 250 to 300 pounds. The car is pushed by hand under the converter, though in some works a hydraulic piston is used to handle it. In the Heinze works in Butte, where the copper carries a large percentage of gold and silver, it is cast into thin plates so as to insure greater facility and accuracy in sampling.

At all the Arizona works remelting furnaces have been dispensed with. At the Copper Queen the matte, made from a mixture of oxidized and sulphuretted ores in cupolas of 120 inches by 42 inches at the tuyeres, is discharged into large wells which are mounted on rollers, and rotated like the converters by hydraulic machinery, one well standing in front of each furnace. From the wells the slag flows continuously, and the matte is poured directly into the converter, which is placed on a lower level. There is thus secured the minimum of handling. But though the capacity of each furnace is adjusted as accurately as possible to the capacity of its own converter, the furnace has occasionally to wait for a converter and the converter for the furnace, more especially as the matte should not be poured until the well is nearly full, lest the slag in any quantity accompany it into the converter. The tilting well was adopted after experiencing the difficulty of controlling the flow through a tap-hole directly into the converter from a deep receptacle holding so many tons of matte. In order to remedy the defects of the plan each furnace is being provided with two wells in tandem. An electric crane is being erected to move the matte from any furnace well to any converter, and to lift the converter slags and pour them into one of the wells nearest a furnace stack. In works now being erected at Nacosari (see article on copper mining at Nacosari in MINING AND SCIENTIFIC PRESS, March 31, 1900), in Sonora, the well is placed to the side of the furnace instead of in front and can be tilted to the the rear as well as to the front, and therefore when it has to be emptied of matte the supernatant slag can be poured off to the rear.

At the large works of the United Verde Company, in Yavapai county, Arizona, where large trough converters of nominally ten tons capacity are used, the cupola furnaces are discharged into large stationary wells lined with magnesia brick. The slag which flows from the wells is removed by four-ton pots propelled by electric motors, and the matte carried to the converter by an electric crane in ten-ton unlined steel ladles. Wells are also coupled to the furnaces in the Detroit Copper Company's works, but there the matte is conveyed to the converter in ladles on an electric car. At the Arizona Copper Company's works in Clifton, the matte tapped directly from the cupola is stored in a reverberatory furnace, from which it is transferred, as required, to the converter by a ladle moved by an electric crane. The fuel consumption in keeping the heat in the reverberatory is very light.

The largest converters on this side of the water, those at Aguas Calientes, Mexico, which are 96 inches in diameter, by 16 feet high, are cylindrical. Only one of the sections, namely the bottom, can be removed for lining; the middle and top sections are relined in place after the fresh bottom section has been returned. The plan of relining in place is, as pointed out, open to the objection of throwing a whole section out of work for a long period. The use of very large converters has not, heretofore, found general favor, though most of the arguments which can be adduced in their support for the treatment of steel would likewise apply in the treatment of copper. The size of converters at the principal works to-day are as follows:

Aguas Calientes, 96 inches by 16 feet.

Boston and Montana, round converters, 7 feet 1½ inches maximum diameter, height over all 11 feet 9 inches.

Anaconda converters, maximum diameter 6 feet 1 inch, height over all 9 feet 10 inches.

Stalmann square converter, 5 feet by 5 feet; height over all 7 feet 10 inches.

Trough converters used at the United Verde.

Trough converters used at the Copper Queen, Arizona Copper Company, and Detroit Copper Company, 8 feet in length and 5 feet 8 inches in diameter. Trough converters at Nacozain, Sonora, 9 feet in length and 6 feet 8 inches in diameter.

Four types of converters are in use:

1st. The circular upright converter with elevated tuyeres.

2d. The upright converter with square body and trough-shaped bottom, designed by Mr. Stalmann. Both these revolve on trunnions.

3d. The trough or barrel converter, resting and revolving on rollers.

4th. The David selecteur, or oval upright converter, with bottom tuyeres and protruding pocket in which to collect the first copper formed.

The forms of converter above enumerated will undergo still further modification. The direction of change will probably tend towards effecting the smelting and the converting in the same furnace. We have seen that the difficulty Holloway met with in trying to smelt in the stack of a cupola, using the heat from the escaping gases generated by blowing through the matte in the hearth, wrecked his enterprise. The project is so attractive and seems so simple that it has possessed a fascination for the metallurgist, and been proposed again and again with manifold variations. But in fact it is surrounded with almost insuperable difficulties, and offers but few advantages. Such complicated metallurgical operations, when they are violently corrosive, and therefore destructive of the structural material of the furnace, can rarely be effectively conducted in close furnaces. The obstacles which beset pyritic smelting when performed alone in a seperate furnace have proved to be many and serious. Add to these obstacles those which must attend the concentration of the matte in the crucible of the same furnace, though neither the furnace nor the crucible can be reached for relining, and the difficulty of disposing of the gases, which, containing a notable quantity of condensable vapor, are sure to clog up the flues, and we have to meet and overcome such a combination of unfavorable conditions that the task would almost seem to be hopeless.

But the smelting of ore into matte and the subsequent conversion of matte into copper by the injection of air into a reverberatory furnace is not open to the same objections, and may prove to be not only practicable but economical. Large reverberatories are now being built capable of smelting more than 150 tons of ore a day, and therefore accumulating a very large body of matte. In bessemerizing in the same open furnace silica or siliceous ore could be more effectually added to the charge than in the converter, and the cost of lining correspondingly reduced.

Besides the converter, the only other essential element of the plant is the blowing engine. The only type of blower heretofore used has been one or other pattern of the direct connected blowing engine.

(TO BE CONTINUED.)

*Condensed from a paper read by JAMES DOUGLAS before the London Institution Mining and Metallurgy.

Shaft Sinking by Rounds.

TO THE EDITOR:—Herewith is furnished an extract from one of our shaft record books. We have found this method of following up our shaft work to be very satisfactory, inasmuch as it gives us the personal equation of every man employed on the work.

Auburn, Cal.

SINKING RECORD NO. 3 SHAFT BY ROUNDS.

SHAFT 4½′x6′ INSIDE OF TIMBERS.

DATE.	Round No.	Commenced Drilling	Finished Drilling	No. Holes	Finished Mucking	No. Skips—940 lbs each.	Commenced Timbering.	Finished Timbering.	No. Sets.	Total Hours	Footage	REMARKS.
1900.												
March 3	55	12:30A	.....	.....	.....	....	....	....	..	.....	.....	.....
			26:15	1 plug								
4	..	.....	2:45A	21	11:50P	59	....	....	..	47:10	4′	.....
4	56	11:50P	.....	.....	.....	....	....	....	..	.....	.....	.....
			25:00									
6	..	.....	12:50A	20	6:00P	53	....	....	..	42:10	3′ 8″	.....
6	57	6:00P	.....	.....	.....	....	....	....	..	.....	.....	.....
			25:45	1 plug								
7	..	.....	7:45P	20	.....	....	....	....	..	.....	.....	.....
8	..	.....	.....	.....	2:25P	50	....	....	..	44:25	3′ 8″	.....
8	58	2:25P	.....	.....	.....	....	....	....	..	.....	.....	.....
			27:50									
9	..	.....	6:15P	20	.....	....	....	....	..	.....	.....	Delay 2½ hours changing machine and hose.
10	..	.....	.....	.....	3:00P	62	....	....	..	48:35	4′	.....

SINKING RECORD NO. 3 SHAFT BY SHIFTS.

SHIFT NO. 1, 7A. TO 3P.; NO. 2, 3P. TO 11P.; NO. 3, 11P. TO 7A.

Machine Man.....J. Doe.	Machine Man.....W. Peeler.	Machine Man.....J. Patrick.
Chucktender.....R. Roe.	Chucktender.....P. Miner.	Chucktender.....I. Skinner.

DATE.	Round No.	Shift No.	Holes Drilled	Skips Mucked	Tons Mucked	No. Times Shot.	REMARKS, SUNDRY WORK, ETC.	Shift No.	Holes Drilled	Skips Mucked	Tons Mucked	No. Times Shot.	REMARKS, SUNDRY WORK, ETC.	Shift No.	Holes Drilled	Skips Mucked	Tons Mucked	No. Times Shot.	REMARKS, SUNDRY WORK, ETC.
1900.																			
March 3	55	3	1 plug 1½	7	3.29	1	Shot cuts 2:45A. Put in mudsills and track.	2	7½	..	.....	..	.....	1	6½	..	.....	..	Changed bar.
4	55 & 56	3	5½	2	.94	..	Comm'd drilling 11:50P.	2	.....	26	11.59	1	.....	1	..	24	11.78	1	.....
5	56	3	1	12	5.65	2	Finished drilling 12:50A.	2	7	..	.....	..	.....	1	6½	..	.....	..	Changed bar.
6	56 & 57	3	7	..	.....	..	.....	2	4	9	4.24	..	Commenced drilling 6P.	1	..	32	15.05	1	.....
7	57	3	.....	12	5.65	2	Put in mudsill and track.	2	1 plug 2½	8	3.8	1	Finished drilling 7:45P. Put in pipe.	1	6½	..	.....	..	Changed bar.
8	57 & 58	3	5	..	.....	..	Changed bar, broke spring and changed machine.	2	8	..	.....	..	.....	1	..	30	14.1	..	Finished mucking 2:25. Set up machine.
9	58	3	.....	30	14.1	1	.....	2	2	12	5.65	1	Shot at 6:15P. Put in mudsill and track.	1	4½	..	.....	..	Changed machine and hose, delay 2:30.
10	58 & 59	3	6	..	.....	..	Changed bar.	2	6½	..	.....	..	Delay 1 hour changed machine. Set up 3P.	1	..	20	9.4	1	Picked bottom.

MINING SUMMARY.

ALASKA.

Reports come of a strike at the Sea Level mine, Thorne arm, southeastern Alaska, where sixteen men have been continuously employed during the winter. Since this mine was opened up there have been driven 800 feet shaft, tunnels and crosscuts. There are 3000 tons of milling ore on the dump. A stamp mill is projected.

The steamers Al-Ki and Seattle took north several miners for the Treadwell mines and construction lumber for the additional stamps. The new mill structure to be erected on the Treadwell property will consume 1,000,000 feet of lumber. It is expected that by October 1st over 1000 stamps will be dropping at Douglas island.

About 500 men left San Francisco for Cape Nome this week. As many more went from Northern ports.

ARIZONA.

COCHISE COUNTY.

The Commonwealth mine, at Pearce, is credited with having produced gold and silver bullion during April valued at $120,000.

GILA COUNTY.

Supt. Calder of the Pinto Creek M. & S. Co. has let a contract for a 300-foot tunnel on the Yo Tambien mine.

Mgr. Andrus of the Globe sampling works has shipped two carloads ore to El Paso.

At Globe, the Old Dominion, for the twenty days' run in April, produced 460,000 pounds of copper.

MOJAVE COUNTY.

E. Hilty is operating the Alata mine at Chloride.

Near Chloride the Diana M. Co. of Los Angeles, incorporated under the laws of Arizona and stocked at $600,000, H. B. Eakins secretary, will develop a group of claims west of Chloride, in the Sacramento valley.

YAVAPAI COUNTY.

At Cherry creek the Eclipse M. Co. has a 5-stamp mill at work. The G. G. M. M. Co. is sinking the Mammoth shaft to the 300-foot level. The O'Leary M. Co. has material on the ground to erect a 5-stamp mill.

At Jerome to the United Verde's smelting plant is being added a 20-foot extension and a new office building.

The 48-ton smelter of the Verde Queen M. Co. at Jerome is completed.

YUMA COUNTY.

El Rey is the town growing up around the King of Arizona mine, 50 miles north of Texas Hill, 45 miles on the Arizona side of the Colorado river and 30 miles from Castle Dome, connected with Texas Hill and Gila City by stage lines. Several men are employed at the mine and cyanide plant. Water is had from three wells, each over 1000 feet deep, 5 miles from the plant. Storage tanks have been constructed to hold 150,000 gallons.

CALIFORNIA.

ALAMEDA COUNTY.

J. C. Hays and J. W. Hampton have located a talc mine in the vicinity of Livermore.

AMADOR COUNTY.

Near Pine Grove work on the Dane and Mitchell mines has been resumed under the superintendency of L. Heiner.

The Belmont mine is being operated by J. McKelvey.

The Jackson Exploration Development Co., Ltd., is in receipt of a communication from its consulting engineer, John Ross Jr., in which he says: "I do not usually write to the companies unless a report is called for, but in this case I feel that I would not be doing my full duty to your company if I did not write and urge you to continue this work after so much money has been spent." A sub-committee of the shareholders had recommended the directors to cease further expenditure of an exploratory nature on the Amador Queen mine, with a view to husbanding the cash resources of the company. Upon the receipt of Mr. Ross' letter, however, the directors decided to issue the remaining shares, with a view to further development.

Sutter Creek Record: Supt. Tregloan at the South Spring Hill mine, Amador City, will put the mine in repair.——Near the El Dorado county line the old Richmond property is being opened up under the name of the Philadelphia mine by Supt. Haggerty.——At the Gover mine Supt. Purrington has thirty men at work preparing for a new hoist on the north shaft. ——At the Keystone Supt. Pritchard has upwards of 100 men. The compressor will soon be at work.——The new hoist for the Baliol mine will be finished by Knight & Co. next month.

Dispatch: The east shaft of the Kennedy mine is down 1240 feet and being put down 18 feet a week.——At the Spagnolia mine, Clinton, the lowest value so far is $3.30 a ton, and the rock goes from that to $30 a ton on drill borings.——At the South Eureka low-grade ore is being uncovered and Supt. Parks says the indications for a good, permanent mine are excellent.

BUTTE COUNTY.

T. W. Reece will this season operate the Amo mine, near Oroville. Twenty men are now cutting a bedrock tunnel.

The Spring Valley hydraulic gold mine at Cherokee will resume; work on the restraining dam has begun. Mgr. Holl and Supt. Hellman will direct operations.

CALAVERAS COUNTY.

G. Tellis of San Francisco has bonded the Josephine mine, near West Point. After the shaft is unwatered sinking will be resumed.

The mill test of 100 tons of ore from the Cape Horn mine, near West Point, was considered sufficiently satisfactory in result to justify the placing of a small stamp mill. The same action is reported from the Commodore mine.

Regarding the Sheep Ranch mine, the mill is running, the shaft has been cleaned and forty men are at work.

H. E. Pickett of Placerville has a three months' option on the Lamphear, near Mokelumne Hill.

EL DORADO COUNTY.

Georgetown Gazette: At a miners' meeting at Volcanoville, J. W. Edmondson was re-elected mining recorder of the district. ——Messrs. Jones & Roberts have bonded the Hart mine, two miles from Georgetown.——At the Garfield, owned by Senator Chapman, the tunnel is being pushed to tap the ledge.——Hinkley Brothers & Kenna have struck pay gravel. Their tunnel is in 760 feet, through solid bedrock. ——The crosscut is being extended in the tunnel of the Kentucky Flat mine.——Spencer & Morgan are taking out gravel from the Tiedeman mine tunnel.

HUMBOLDT COUNTY.

The main flume of the Orleans Bar G. M. Co. is completed. Some of the mines in that vicinity are closing down on account of lack of water. Little snow fell on the mountains—result, a short season.

The Pacific Beach M. Co., Little River, is sold to the Acheson M. & M. Co., of New York, who now take charge.

KERN COUNTY.

The Californian reports a find of gold 15 miles east of Randsburg, a dry placer proposition.

MARIPOSA COUNTY.

Near Coulterville, the Nameless Co., White's gulch, proposes building a dam on the Merced river and putting in a quartz mill to run by water power.

The Columbus Co. projects a new mill.

The Murphy mill is crushing pay ore.

L. E. Aubury has bonded the Romo and Sierra Rica mines, Colorado district.

NAPA COUNTY.

During April the following number of flasks of quicksilver were shipped from the mines near Napa: Napa 351, Ætna 300, Great Western 128, Vallejo 79, Sulphur Bank 24. Total 882 flasks—a decrease of 153 flasks from the March shipment. The product of three Napa county quicksilver mines for the past two calendar years compares as follows:

	1898, flasks.	1899, flasks.
New Idria	5,000	4,780
Ætna	3,450	3,450
Napa	7,850	5,850
Totals	16,300	14,080

The sales of quicksilver in 1899 and expenses are as follows:

	Sales.	Expenses.
Ætna	$156,454	$ 86,190
Napa	239,449	146,100
New Idria	195,298	97,256
Totals	$591,201	$329,546

The Ætna paid $45,000 in dividends, the other two mines each $90,000. The New Idria expended $13,760, the Ætna $2769 and the Napa $4387 for construction and repairs.

NEVADA COUNTY.

The poles from Floriston supporting the wires for transmission of electric power to the Comstock are Oregon yellow pine, soaked in oil, 1 foot in diameter at the base, set 130 feet apart. The pole line is equipped with six wires, each one ¼ inch in diameter and weighing about two ounces to the foot. The total length of the six wires, if stretched in a single line, would be 180 miles, weight 118,000 pounds, at 18 cents per pound the bare wire required for the pole line costing $21,384. The number of poles required for the line is about 1300.

A 16-inch pump has been installed at the Union Hill mine by W. C. D. Body.

Work on the new 20-stamp mill at the Plumbago mine begins this week in charge of C. C. Weisenburger.

Union: The U. S. Circuit Court of Appeals has sustained the opinion of Judge Morrow of the U. S. District Court in the case of Gaylord et al. vs. the Gold Hill M. Co. The property involved was the Nevada City mine, recently purchased by the Champion M. Co. It was a question of title between the lien holders and Eastern bond holders, who claimed the mine. After the opinion of Judge Morrow in favor of the miners, the Champion M. Co. purchased the property and took all the risk of further litigation and decisions. The price paid was $35,000, and the last payment was made a few weeks ago. The Champion Co. now wins the case.

PLACER COUNTY.

At Gold Run Supt. Moody of the Inskip M. Co. has successfully made connection, enabling him to go on with hydraulic work by means of completed tunnel and upraise.

The Sailor Con. M. Co. has levied an assessment of 1 cent per share, delinquent June 22.

RIVERSIDE COUNTY.

(Special Correspondence).—The Granite mine is owned by the Riverside M. & M. Co., 40 miles north of here, and has just put in a Mystic mill and a 20-ton cyanide plant.

Salton, May 13.

SAN DIEGO COUNTY.

Some stir is reported around Fallbrook, where several claims have been located and considerable development work begun by A. Campbell and F. W. Chapin.

SHASTA COUNTY.

The Fair View G. M. Co., T. J. Jordan, J. W. George, J. C., E. and M. A. Dyas, capital $100,000, all subscribed, has been organized to work the Rabbit gold mine.

SISKIYOU COUNTY.

(Special Correspondence).—W. Wike recently discovered a ledge near Salmon river 25 feet wide, and is arranging to take ore to the Jumbo mill, 8 miles. The mine is bonded to men in Grant's Pass, Or.

L. Errickson's strike on White's gulch continues to show good ore. H. Finley has bought an interest.

C. Clinton has opened a body of low-grade ore, 70 feet wide, on Salmon river.

Cleaver & Co., at the head of White's gulch, continue taking ore averaging $20 per ton.

Hickey Bros., who own five adjoining claims to Cleaver & Co., are beginning to work on the Jim Budd mine.

The recent break in the Salmon river ditch and flume has been repaired, and their hydraulic mine near Sawyer's Bar is being worked day and night with success.

Sawyer's Bar, May 15.

Jno. Daggett has twenty-five men at work at the Black Bear mine.

An expert visited Jackson creek at South Fork of Scott river lately, to purchase mining ground, and after discovering it was in the railroad grant, bought the land of the railroad company and paid for it. Upon making a survey, it was found the land bought was a long way off toward the summit of Scott mountain, and not worth anything.

Journal: The Baer Brothers, Maxwell, Dwinnell and Frye sold their Cherry Hill quartz mine and mill last week to C. F. Baker for $25,000.

TRINITY COUNTY.

The Last Chance M. Co. has let a contract for enlargement of ditch to carry water to their properties near Lowden ranch. The company will also improve the property this summer.

G. E. Bailey, Supt. Adele M. C., Lewiston, has a rotary mill to work the cement gravel, the first attempt of the kind in Trinity county.

TUOLUMNE COUNTY.

Mgr. J. E. Potter will put a 10-stamp mill on the Clio mine, Jacksonville, to be operated by steam power.

At the Tri-Color, at Tuttletown, the new hoisting gear and equipment is about ready for operation.

The Rising Sun mill has put through seventy tons from the Little Beauty mine, Arrastraville, that gave good returns.

The Wheal Perrin, at Soulsbyville, is being unwatered.

Supt. Moore, near Summersville, has unwatered the Green mine.

Supt. Graham is developing the Duleeke mine, near Groveland. Supt. J. P. James is sinking and drifting on the Climax mine.

Democrat: The shaft of the Mack Con. at Big Oak Flat is down 430 feet, with levels at 150 and 200. The vein is from 6 to 25 feet, and, independent of rich spots, the ore yields from $5 to $7 in free gold, and when the mine is in proper shape for rapid and economic stoping a 20-stamp mill will be erected.——At the Bawn the shaft is 640 feet deep and will be sunk to a depth of 1200 feet.——The Dreisam has hung up its stamps pending the sinking of the main shaft to the 400-foot mark. The present depth of the shaft is 200 feet. ——The Seminole group of mines, after lying idle for several years, is to be worked again, under the management of C. H. Thomas, formerly Supt. Dead Horse mine.

COLORADO.

BOULDER COUNTY.

Boulder hears that the Cold Spring M. & M. Co. has about decided to put up a 100-stamp mill on Left Hand creek near the mouth of their tunnel. A present visit of W. A. Jackson, a director, and J. M. Page, manager of the company, gives rise to the report.

Ward Miner: The Monongahela mine, at Sunshine, is sold to the Venango M. & R. Co. for $15,000.——At the B. & M. mine, Supt. R. J. Walter is succeeded by M. Bossen.——J. Rice has leased and bonded the Colorado mine and the U. P. group for $40,000.

CHAFFEE COUNTY.

At Granite the Hudson tunnel is in 410 feet. The 3-foot body of mill ore holds out.

CLEAR CREEK COUNTY.

Near Georgetown the Bismarck mine last week shipped five tons, which gave values of 909 ounces silver and 51% lead per ton.

The Courier claims that Georgetown produces the highest grade silver ore of any mining region in the world and gives a few recent mill runs: Seventy-seven sacks of ore from the Peterson lease on the Bismarck, sampled, brought $2505. The last run of Roberts & Co., from the same mine, returned 834 ounces. The Rubado lease on the Pelican is producing 400-ounce ore in five ton lots. The last run from the Aliunde carried 675 ounces silver and 34% lead, and brought over $7000. James Lyon & Co. shipped twenty tons of ore from the Smuggler last Saturday that milled about 200 ounces silver and 58% lead. At the Chamberlain & Co.'s sampling works the value of the ore crushed and sampled in the space of three hours exceeded $7400.

FREMONT COUNTY.

Manager Milliken of the Colorado Ore Reduction Co. will install a gas plant at Florence for roasting ores.

GILPIN COUNTY.

At the Growers mine Supt. Thos. Dunstone is advertising a contract to sink 600 feet in the Running lode shaft, near Black Hawk.

During April the shipments of crude ore and tailings from Black Hawk to outside points for treatment only reached a total of 186 tons, not more than half the regular shipments, showing how the storms hindered ore shipments.

GUNNISON COUNTY.

W. A. Welch, Supt. Ruby Chief mine, says that his company is prepared to thoroughly develop the Ruby Chief and will extensively operate it. J. G. Berryhill, Des Moines, Iowa, is president and general manager.

HUERFANO COUNTY.

Walsenburg reports that the Scantic, owned exclusively by Eastern men, has closed down indefinitely. The Scantic has a tunnel over 500 feet long. The owners had been working a large number of men all winter.

LAKE COUNTY.

Bismuth ore is being shipped from the Ballard, near Leadville. The first shipment of seventy-five tons went to London last week to a brokerage firm, thence to Freiburg, Saxony, for treatment.

The Valentine M. Co. at Leadville has acquired 105 acres from the Oro M.,D. & F. Co., and will develop this area by sinking two more deep shafts. Test of the ground by diamond drill showed 312 feet of wash, 93 feet of white and black porphyry, 45 feet of birdseye porphyry, 2 feet of mineralized contact, and 35 feet of lime from the contact to the point where boring stopped, a total depth of 487 feet.

At Leadville, the Home M. Co. is considering a plan to effect a consolidation between it and the New Leadville M. Co., which owns sixty-one acres on Rock hill, to dissolve both the Home and New Leadville Companies and form a new company to be known as the Leadville Home Consolidated Mining Co., capital 1,500,000 shares, each stockholder of the Home to receive twenty shares of the new capital stock, the stockholders of the New Leadville Co. to receive 225,000 shares, leaving 275 shares for treasury stock.

LINCOLN COUNTY.

J. J. Fay, of Los Angeles, has bought the Golden Treasure, Last Chance, Red Belt, Golden Star, Tip Top and Golden Queen claims, opposite Bull's Head canyon on the Nevada side of the Colorado river, for $20,000.

MINERAL COUNTY.

(Special Correspondence).—The Commodore is shipping 4500 tons per month of

crude ore. The mine is opened through five tunnels, the highest two not being used. The three others, about 400 feet apart vertically, extend in from 3000 to 4000 feet, all being connected by upraises. The ore is carried to the mouths of tunnels in cars, whence it is conveyed to ore bins at the railroad by bucket tramway. These ores are silver-lead, the lead being the most prominent factor. The Commodore power plant comprises a 5-foot water wheel, driven by water through a 26-inch pipe line, a five-drill air compressor and a 135 H. P. electric generator. It is intended later on to operate an electric hoist.

The Wooster tunnel, originally known as the Nelson, is now in about 7000 feet and drains the Amethyst, Chance and United mines. The tunnel has a fall of 6 inches to 100 feet. Ore from the Bachelor and Chance is transported through this tunnel. W. G. Boyle is manager of the Wooster and also works the Bachelor mine under lease.

The Amethyst is being worked by the owner company and is in charge of L. E. Campbell, managing director, and Cyrus Miller, Supt. This property ships the heaviest tonnage of any of the Creede mines.

The Happy Thought, in charge of F. E. Wheeler, is sinking a shaft to the level of the Wooster tunnel, having sunk about 1200 feet and having about 600 feet deeper to sink to strike tunnel level.

Up East Willow creek the Ridge and Solomon are working, each operating a concentrating mill. The Solomon mill is equipped with crushers, rolls, jigs and Wilfley tables, and is in charge of J. A. Smith. About forty tons per day are concentrated. Supt. Abbott states that the ores are somewhat siliceous and the sulphides considerably oxidized.

The Ridge, in charge of Supt. E. R. Mosher, is worked through a tunnel which penetrates to a horizontal depth of 1500 feet. At a point in the tunnel, 400 feet from the entrance, a shaft sinks 400 feet on the vein, a skip being operated by steam. The Ridge concentrator is operating, in charge of H. L. Decker, the product amounting to about 300 tons of concentrates per month. The power plant has two boilers of 180 H. P., a four-drill compressor and two pumps of 1000 gallons of water per minute capacity.

The United mines, next to the Amethyst, are operating under lease to the Big Kanawa Leasing Co., of which H. C. Rowley is Supt. A connection will soon be made with the Wooster tunnel. The property is shipping. WASCOTT.

Creede, May 7.

PARK COUNTY.

The Peerless Maud mine has resumed under the management of Hugh Dyatt of Leadville.

PITKIN COUNTY.

At Aspen, the Times says that a strike has been made in the Mary B. — five ounces silver and 50% lead.

SAN JUAN COUNTY.

Near Gladstone the Henrietta and Mineral King are dumping lead and copper ores, to be treated by water and heat concentration through the company's proposed matte smelter and concentrating mill to be built on Cement creek, two miles below Gladstone.

A. Lamson has tungsten claims on Dry gulch, carrying tungstate of manganese. The Fisher mill will soon start up on these ores.

A strike is reported near Silverton in the Copper Belle mine, at a depth of 250 feet, of an 8-inch streak of a gold bearing telluride, which causes the Chronicle to suggest that the Silvery San Juan is a misnomer, and that the real name should be the Golden San Juan. The region comprises San Miguel, San Juan and Hinsdale. It is a country of long, deep fissures cutting and penetrating all formations, including the eruptive, sedimentary and fundamental rocks. In the larger mines the character of the ores frequently changes with depth. On the surface the Tom Boy mine, near Telluride, had its values mostly in silver. It has now become an almost exclusive gold mine. The Silver Lake mine, near Silverton, has with depth increased its values by 300%.

SUMMIT COUNTY.

Breckenridge reports that satisfactory financial arrangements have been concluded by the North American Gold Dredging Co., so far as financing the company for the present season is concerned, whereby it will resume mining operations June 1.

TELLER COUNTY.

The Detroit Reduction Works, Independence, still await machinery shipped April 26. When it reaches Independence and is in position the mill will handle 100 tons daily.

The G. B. M. Co. has sold its Badger claim to C. W. Kurie for $10,000.

The Amazon G. M. Co. has sold its Modoc claim to the Portland G. M. Co. for $50,000, and the proceeds of the sale were divided in the form of a 10-cent per share dividend.

The Venture corporation, which has acquired the Independence mine, has decided to build a $300,000 reduction plant either at Colorado City or Florence.

In the Portland mine at Cripple Creek the ore body has opened up into 57 feet.

The El Paso has shipped 250 tons. Returns from fifty tons went $162.50 per ton. It is expected that the remainder will run as high.

Post: At the Independence mine all the miners employed are members of the miners' union, but many of them have fallen behind with their dues. The secretary of the local union has been allowed to post notices requesting the delinquents to settle up and show clear cards to the union by May 15. This request has been indorsed privately by the superintendent of the mine, and the miners feel that a failure to comply will be followed shortly by a discharge.

IDAHO.

CASSIA COUNTY.

F. Alder, San Pete county, Utah, has secured control of the Black Prince group, paying E. Romney $12,500 for 25,000 shares.

NEZ PERCE COUNTY.

The Wild Goose Rapids M. & M. Co., capital $100,000, has incorporated.

SHOSHONE COUNTY.

At Murray it is reported that the Stonewall has been bonded to Butte men for $20,000.

At Wallace the Headlight M. Co. owns four claims adjoining the Mammoth on the west, covering the same vein for 3000 feet, and proposes to open up the ground by two tunnels.

A Spokane correspondent says the Cœur d'Alene country is in a prosperous condition, and the production will far exceed anything ever produced. The output for the month of April was 14,000 tons of concentrates. All labor troubles are settled; there is abundance of good labor to supply all demands, and things have settled down to a solid basis. The hotels are filled with strangers, looking over the country with a possible view of investment, which is a condition of affairs that has not existed in that country since 1892. Each and every mine in the Cœur d'Alene country is working to full capacity and promising prospects are sought.

At Burke the Tiger–Poorman is temporarily closed down while retimbering is being done on the shaft.

WASHINGTON COUNTY.

S. F. Pair is going to put in a small test plant at Cuprum, to extract the copper from the ore of the Seven Devils. He thinks he has a process whereby he can extract copper at a cost of 3 cents a pound for the copper and save 95% gold and silver.

MICHIGAN.

In April 5767 tons of Baltic rock were stamped at the Atlantic mill, from which sixty-two tons of mineral were obtained—a percentage of 1.08—equivalent to 21.6 pounds of mineral to the ton of rock. The mineral yield in December, 1899, was 25.4 pounds, in January, 1900, 26.4 pounds.

MONTANA.

CASCADE COUNTY.

The Montana Central strike is settled and the Boston & Montana Co. is making regular daily shipments of 2500 tons of ore to Great Falls.

L. S. McLure of San Diego, Cal., has bought the Broadwater mine at Neihart from Searles of New York.

FLATHEAD COUNTY.

Near Libby, Larson & Greenough will resume work on the Buzz Saw mine.

J. Tholcke is manager of the Cabinet Queen M. Co. on Grouse mountain, near Troy.

PARK COUNTY.

Mgr. J. F. Nolan, at the St. Julien mill at Emigrant, expects to have his machinery in place and ready July 1.

The McGinnis lode, New World district, is sold to the McGinnis G. M. Co. for $30,000.

SILVER BOW COUNTY.

The Anaconda Standard hears that the Anaconda M. Co. has ordered for the immediate termination of all leases now held of company mining properties.

NEVADA.

CHURCHILL COUNTY.

For his nickel, cobalt and copper mines at Cottonwood, Geo. Lovelock is locally credited with having accepted from an English company an offer of $50,000.

ELKO COUNTY.

At the Young America, Tuscarora, mill ten more stamps are to be added.

HUMBOLDT COUNTY.

The Glasgow & Western Co. started up another smelter at Golconda last week and the third is having necessary repairs made preparatory to being fired up. The company, it is understood, has reached the conclusion that concentrating is not necessary and will soon begin three more smelters for the ores of the Adelaide and Copper canyon mines.

LINCOLN COUNTY.

At Sandy, from the Potosi mine a car of lead ore averaged 56% lead, with gold and silver values. The shipment was made to Pueblo. Bybe & Smith, who own fifty claims, are doing development work. J. R. Newberry has commenced work on the Tam o'Shanter.

LYON COUNTY.

W. J. Kelly has sold the Bluestone copper mines, 4 miles from Yerington, for $10,000.

ORMSBY COUNTY.

The Idaho-Montana Copper-Gold Mines Co. has incorporated at Carson "to operate mines and smelters in Nevada." Capital stock, $1,600,000.

STOREY COUNTY.

The Con. Cal. Va. mine shipped to the Kinkead mill during the past week 223 tons and 1600 pounds of ore, assay value $44.39 per ton. The average assay value (per battery samples) of all the ore worked at the mill during the week (175 tons) was $37.30 per ton.

Last week a reduction was made in the forces at the Belcher and Yellow Jacket mines, pending the changing of the machinery to the requirements of the electric power.

NEW MEXICO.

SANTA FE COUNTY.

At San Pedro, the S. P. G. & C. M. Co. has 150 men employed in the mine and grading for the 200-ton smelter is in course of erection, to be ready Nov. 1.

NEW HAMPSHIRE.

(Special Correspondence). — The Newfound Mica M. Co. are working here with fair success in a strong vein of ruby mica, weekly shipping some fine cut mica. This company is owned by men from Worcester, Mass. C. F. Rice is manager. They have demonstrated the value of this class of mining and are about adding to this plant several Rand steam drills, which will largely increase their output.

Alexandria, May 5.

OREGON.

BAKER COUNTY.

Jno. T. English, at Sumpter, will have seventy stamps in operation on the Golconda by October 1.

GRANT COUNTY.

Near Granite a 200-ton cyanide plant is being put in at the Cougar by Evans Larkin, the owner.

C. R. Aldrin proposes a tunnel 7x7 feet 3000 feet long through Quebec mountain.

Supt. Thomsen is operating the 10-stamp mill of the May Queen.

C. B. Preble projects putting up hoisting works on the Gray Eagle.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Homestake mine—the largest in the Black Hills—has a capital of $21,000,000, upon which it regularly pays 6% dividends. The company is about to install a $200,000 cyanide plant. It also has a water works scheme under way, which will cost $1,000,000. A ditch 15 miles long will be dug to bring the water down, and will be used to supply the mine and the cities of Deadwood and Lead with water. The Homestake is now running 700 heads of stamps, and is stamping about 2500 tons of rock daily, or nearly half as much as the Calumet & Hecla mine. It is thought likely that the Homestake will soon add 400 more stamps.

The Golden Reward G. M. Co.—the second largest—paid $800,000 in dividends in '99.

UTAH.

BEAVER COUNTY.

At the Horn Silver Co.'s property the copper ores on the 700 and 800 are opening out. From 70 to 80 tons per week of ore averaging 26% to 28% copper, 25% to 30% lead, 15 to 18 ounces silver and $1 in gold are being marketed. No high-grade copper has yet been struck on the lowest levels.

JUAB COUNTY.

The Farrel interest this week paid $690,000 for the McIntyre holdings in the Mammoth, thus securing control.

At Eureka the Bullion–Beck M. Co. has made a strike on the Moulton claim. Supt. Farnsworth has 3 feet of galena ore in the tunnel assaying 40% lead, 25 ounces silver and $2 in gold.

WASHINGTON.

FERRY COUNTY.

Republic reports a strike in the Black Tail mine, a chimney of high grade ore.

OKANOGAN COUNTY.

The American Flag mine, on the Methow river, has ore running $20 per ton in gold. The mine is reached by stage from Brewster, connecting with the stage from Coulee City and with steamers from Wenatchee.

STEVENS COUNTY.

The Northwest M. Co. has completed its survey of the Acme group, 7 miles south of Kettle Falls, five claims, upon which the company have a bond. Bad air has driven the men out of the winze.

WHITMAN COUNTY.

Near Palouse the Bishop mine, adjoining the Gold Bug, on Jerome creek, is the first mine to begin shipping, and has several hundred tons of ore on the dump ready to be worked by the smelters. Mgr. Bishop has a rate of $5 a ton from the Northern Pacific from Palouse to Everett or Tacoma, and hopes to make the first shipment June 1.

WYOMING.

J. S. Norvell of Anderson, Cal., has organized the Norvell-Pickrel C. M. Co. to develop property in that neighborhood.

FOREIGN.

BRITISH COLUMBIA.

F. Cook, of San Francisco, is installing a plant on the Sun Rise group of hydraulic leases on Pine creek below Discovery in Atlin. The plans of the Sun Rise Co. provide for the installation of four giants, the pipe to be 30 inches in diameter, the ditch, 6 miles long and 12 feet in width, to carry 7000 miners' inches. L. H. Griffith, of Seattle, is the financial representative.

J. W. McIntosh, of Nevada county, Cal., is prospecting the Race Horse and Feather group of leases on lower Pine creek below Discovery.

V. V. Bloggett of California is constructing a hydraulic plant on Wright creek, which empties into Surprise lake from the south.

The Rossland Miner says L. Merrill has a claim southeast of the I. X. L., from which comes ore carrying 4% nickel and $4 in gold.

At Greenwood district work has been resumed in the Morrison mine, Deadwood camp. F. Oliver is manager.

Camp McKinney reports resumption of ore crushing by the Waterloo mill.

On the Gold Drop mine, near Phœnix, the total development to May 1st was 2000 feet. No. 1 tunnel has 350 feet of drifts and crosscuts and a raise of 100 feet.

The Mother Lode force has been increased.

COREA.

U. S. Consul Allen writes from Seoul that employment in the mines would have to be secured before coming to Corea. The agent of the mines in America is H. A. Noble, representative Oriental Con. M. Co., San Francisco. Prospectors can not operate in Corea, and there is no employment with the mines other than on wages.

RUSSIA.

London advices deny that Hooley, the promoter, received the concessions of the gold mines in Siberia, saying that his only connection is that £7000 of the £1,000,000 capital was furnished from funds under his control.

SPAIN.

A letter from W. B. Carlyle formerly of Rossland, B. C., now superintendent of Rio Tinto mines, says. "There are 135,000,000 tons of ore in sight, of which we must extract 2,000,000 tons this year. We have a good railroad 375 miles long, thirty locomotives on the main line, fifty at the mine, and this year we will handle 5,000,000 tons of ore. There are extensive underground works. Down on the 1200-foot level, I was shown a solid body of ore 660 feet wide. There are 10,000 Spaniards at work. We pay here from 50 cents to 85 cents per day."

THE KLONDIKE.

At Forty Mile river, below Dawson, on the Yukon, five American miners have a channel 40 feet deep, 60 feet in width and 200 feet in length, to turn the water flowing through Forty Mile river and form a new channel. By turning the river out of its present bed they expect to be able to work a stretch of ground nine consecutive claims in length, which will, it is claimed, outrival anything yet discovered in the Klondike. The men have been laboring for over fifteen months constantly, and have been laughed at by every one.

The Yukon Sun has analysis of the season's work on Gold Run and Sulphur creeks. Both of these creeks, Indian river district, are wide and open, unlike Hunker and Bonanza, being no way confined, and consequently were hard to prospect. Sulphur is a creek 23 miles long, and heads from the same dome as Dominion and Hunker; Gold Run is a creek 12 miles long and heads from a dome lying 10

miles east of the Hunker and Dominion dome. Altogether there is close on 2,000,000 buckets (ten pans to the bucket) to be sluiced on Gold Run, and allowing 50 cents to the bucket, the clean-up will be in the neighborhood of $1,000,000. It is computed that there are about 750,000 buckets ready for sluicing on Sulphur claims below Discovery.

Personal.

A. B. HALL is now Supt. Granite mine, Riverside Co., Cal.

COL. J. E. DOOLITTLE has returned to San Francisco from Gold Run, Cal.

E. B. TRUE has gone to Quartzburg, Idaho, to take charge of the Iowa mill.

J. H. CONRAD, a well-known Montana miner, sails on the 25th for Cape Nome.

H. L. MUMA is now Supt. Whalen Con. C. M. Co., Alpha, Eureka county, Nev.

J. T. MCLAUGHLIN is manager San Pedro G. & C. M. Co., San Pedro, N. M.

DR. S. BOWERS, California State Mine Examiner, is sojourning in Shasta county, Cal.

SUPT. E. H. COOK of the United Globe, Ariz., mines, has returned from El Paso, Texas.

FRANKLIN FARRELL, Pres. Sioux and Utah Mining Companies, Tintic, Utah, is visiting Utah.

SUPT. CRUMMER, Republic, Wash., now has charge Black Tail, Quilp and San Poil mines.

J. W. NEILL has resumed management of the Taylor & Brunton sampler, Salt Lake City, Utah.

JNO. T. DONNELLAN has returned to Globe, Ariz., from a visit of six weeks in Colorado and Utah.

J. HUTCHINSON, Gen. manager Trade Dollar Co., has returned to Boise, Idaho, from Baker City, Or.

E. B. SESSIONS succeeds W. H. Hood in the superintendency of the Silver Shield mine, Bingham, Utah.

H. A. MATHER of New York City is in Jerome, Arizona, as secretary and assayer Verde Queen C. Co.

DUNCAN MCVICHIE has been tendered the general management of the U. S. M. Co.'s properties, Bingham, Utah.

M. C. BENTON of Cochise county takes charge at the Copper Bullion Co.'s mines in the Dragoon mountains, Arizona.

B. F. HORN, chief mining engineer, Cpugnamata mines of Chile, is inspecting the Lake Superior copper workings.

J. T. DUNCAN of Nelson, B. C., is examining mining property in the vicinity of Railroad Flat, Calaveras county, Cal.

LIEUT.-GOV. NEFF of California has returned to San Francisco from a visit to his mining property in Amador county, Cal.

BEN AND LEWIS WILLIAMS have gone to their mine near Milton, Calaveras county, Cal., to personally superintend development work.

JOHN CASE, formerly manager Great Falls, Montana, smelter, is manager Bigelow smelting interests in the Lake Superior copper region.

R. KONDO, Supt. of the Ashio copper mine, situated 120 miles from Tokio, Japan, last week visited the works of the United Verde at Jerome, and the Copper Queen at Bisbee, Ariz.

N. R. LEONARD has been appointed Pres. Montana State School of Mines, at an annual salary of $3000. The $25,000 appropriated by the Legislature for the school is now available.

CARL VAN REISCHACH went from Alameda, Cal., this week to take charge of the metallurgical department of the Mexican Ore Reduction Co., Guadalajara, State of Jalisco, Mexico.

J. S. CARTWRIGHT, agent Birmingham, England, E. & M. Co., has returned from a trip to Cochise, Co., Ariz., His company deals extensively in iron ore sent to England as ballast in tramp steamships and sailing vessels.

JOS. MCGILLIVRAY of San Francisco has returned to the Klondike via London, and when navigation opens expects to receive about 150 tons hydraulic mining machinery to work the claims in which his company is interested.

GEN. MGR. L. T. WRIGHT of the Mountain Copper Co., Shasta county, Cal., has gone to London and is locally credited with intention to advise the directors to erect a complete copper refinery at Keswick. The company now ships all its metal from the smelters to its refinery in New Jersey. It is not probable that a refinery will be built.

H. C. CALLAHAN of California, late manager Lake View Consols mine, Australia, is credited with having issued a writ for libel against Chairman Villiers of the company for the statement made at a recent meeting of that company that he kept the board entirely in the dark as to the necessity for reducing the mine's output from 30,000 ounces monthly to 12,000 ounces.

GEO. E. PRICE of Riverside, Cal., is in Dutch Guiana, South America, managing a mining enterprise for a Dutch company near Paramaribo. Mr. Price is a subscriber to this paper as well as other leading mining journals, and he states "for intelligent and legitimate reading in matters pertaining to my business I prefer the MINING AND SCIENTIFIC PRESS to all others." He writes instructing that his paper be forwarded to his new address.

Commercial Paragraphs.

MCFARLANE & CO. of Denver, Colo., recently built and shipped to Breckenridge, Colo., two Lambing excavators for work on placer grounds controlled by L. B. Lambing.

THE Pelton Water Wheel Co. has a $22,000 contract to erect a 1000 H. P. plant for the Compania Minera y Beneficiadora de Teziutlan, Teziutlan, Mexico. Four water wheels of 400 H. P. are to be sent to Lima, Peru.

THE mile length of aerial tramway, 125 buckets, with hourly capacity of ten tons of ore, erected at Lillooet, B. C., for the Toronto–Lillooet G. R. Co., was furnished and put in working operation by the Vulcan Iron Works of San Francisco.

ALMARIN B. PAUL, well known to all readers of this paper, has issued a new pamphlet, having as subjects "Mine Development," "The MacArthur-Forrest Cyanide Process," "The Hydraulic Mining Industry," "Gold in the Black Sands" and "Progress in Ore Reducing Machinery." This pamphlet is issued more with the view of advancing the interest of mining than any personal gain. It will be sent to any subscribers of the MINING AND SCIENTIFIC PRESS on forwarding the address to Mr. Paul, 27 Crocker Building, San Francisco.

Books Received.

Twelve volumes, twentieth annual report U. S. Geological Survey, the usual priceless compendium of latest practical scientific data concerning the economic geology of the nation. Accompanying the work is a special monograph by Waldemar Lindgren, a 257-page volume on the gold and silver veins of Silver City, De Lamar and other mining districts in Idaho, profusely embellished with maps and illustrations, and going into minute detail of the geology and development of that entire region.

"Preliminary report on the Cape Nome Gold Region of Alaska," with maps and illustrations by F. C. Schrader and A. H. Brooks, published by the U. S. Geological Survey, a timely government publication of late authentic data concerning the newest El Dorado.

"New Hydraulics," by M. E. Sullivan, 300 pages, octavo, a scientific discussion of the entire subject, natural laws, etc., and a multitude of tables and formulas, with practical examples of their use, and unusual attention to details of construction and cost. Published by the Mining Reporter, Denver, Colo.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING MAY 8, 1900.

649,400.—PUMP—E. P. Chilson, Chino, Cal.

649,238.—WASHING MACHINE—J. A. Gallagher, Stockton, Cal.

649,052.—ANIMAL TRAP—W. B. Hargan, Stockton, Cal.

649,167.—ENGINE SPEED REGULATOR—C. A. Huffmaster, San Leandro, Cal.

648,960.—ROLLER CRUSHER—F. A. Huntington, Oakland, Cal.

649,313.—WATER ELEVATOR—W. S. Jewell, Oakland, Cal.

649,314.—BRIDLE—G. A. Kelly, Dayton, Wash.

649,318.—FRUIT DRIER—J. L. Larson, Shaw, Ogn.

649,319.—FRUIT DRIER—J. L. Larson, Shaw, Ogn.

649,346.—VALVE—T. F. Payne, Spokane, Wash.

649,082.—FILTER—J. F. H. Stahle, Berkeley, Cal.

649,030.—CAN—W. H. Wright, San Jose, Cal.

Recently Declared Mining Dividends.

Homestake M. Co., 25 cents per share for April and an extra dividend of 25 cents	May 25
Omega G, M. Co., 1½ cents per share, $18,187.50	June 10

Latest Market Reports.

SAN FRANCISCO, May 17, 1900.

SILVER—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59½c (1000 fine); San Francisco, 59½c; Mexican dollars, 49c.

Secretary Gage has completed plans for discovery where the $400,000,000 in gold coined since the early seventies has disappeared to. Basing his figures on the amount of gold coined, Secretary Gage said that there should be at the Treasury, Sub-treasuries and banks in the country about $1,000,000,000 of gold. Investigation shows that of this $400,000,000 has entirely disappeared. Inquiries have been sent to all the manufacturing jewelers in the country asking for information regarding the quantity, kind and value of gold used in the last year. In this way it is hoped to obtain some traces of the gold apparently withdrawn from circulation.

COPPER.—New York: Lake, 1 to 3 casks, 16.75 cash; carload lots, 16.50; Electrolytic, 1 to 3 casks, 16.75; carload lots, 16.25; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $3.97½; St. Louis, $4.00; San Francisco 4¼c, carload lots, 4¼c, 1000 to 4000 lbs.; pipe 7, sheet 8, bar 6c. London, Soft Spanish Lead, £17 5s = 3.75c per lb.

SPELTER. — New York, $4.45; St. Louis, $4.55; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY. — New York, 10c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 40@45c ℔ lb.

IRON. — Pittsburg, pig, No. 2, foundry, $21.50; gray forge, $20.00; San Francisco, bar, per lb., 3¼c.

STEEL. — Billets, Pittsburg, $29.50; sheet bars, $34; San Francisco, bar, 11c to 18c per lb.

QUICKSILVER. — New York, $51.00; London, £9 10s; San Francisco, local, $51.50 ℔ flask of 76½ lbs. Export rates withdrawn.

PLATINUM.— San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

TUNGSTEN.—New York, ℔ lb., $1; San Francisco, $1.25.

FERRO-TUNGSTEN. — New York, 37%, 40c; San Francisco, 75c (60%).

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

FERRO-MANGANESE. — Pittsburg, 80%, $125.

ZINC.—San Francisco, 6c; slab, 6¼c; bar, 8c.

SOLDER. — Half-and-half, 100-lb. lots, 20½c; San Francisco, Plumbers', 100-lb. lots, 17½c.

TIN.—New York, pig, $28.75; San Francisco, ton lots, 31c; 1000 lbs., 32c; 500 lbs., 33c; less, 34c; bar tin, ℔ lb, 37c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

NICKEL.—New York, 45@50c ℔ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ℔ set; 14 oz., 40s., 10½c.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $7.00; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 33@35c ℔ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 2¼c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2¾c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 17, 1900.

9:30 A. M. SESSION.

200 Andes.....06c	100 Mexican.....27c
300 Belcher.....27c	1100 Ophir.....54c
100 Caledonia .$1 10	200 Sierra Nev..32c
100 C. C. & V.$1 40	100 Silver Hill...18c
200.....$1 45	100 Y. Jacket...16c
300 G. & C.....15c	

2:30 P. M. SESSION.

500 Ophir 55c	100 Utah.....07c
200 Mexican.....28c	200 Union.....21c
100 G. & C.....16c	900 Silver Hill..17c
400 C. C.& V..$1 45	200 Challenge...13c
500 Chollar 19c	300 Standard..$3 80
100 Y Jacket....17c	

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ENGINE SPEED REGULATOR.—C. A. Huffmaster, San Leandro, Cal. No. 649,167. Dated May 8, 1900. The object of this invention is to provide a means for varying the speed of an engine or other machine, with relation to that of the governor by which it is normally controlled so that without changing the speed of the governor that of the engine may be varied within certain limits. The governor insures a certain regularity of motion independent of the load, which may be a constantly varying one. It is however desirable in some cases to vary the speed of the engine, and, as the governor is set to operate and control the engine when running at a certain rate of speed, this engine is designed to vary the conditions and connections between the governor and the engine that the speed of the engine may be changed without altering the speed of the governor. This change may be effected by means of bevel-faced pulleys between the governor and the engine, and a means for moving one pulley towards or from the center of its companion, at the same time allowing one of the pulleys to yield laterally during its adjustment over the face of the other pulley.

AUTOMATIC WEIGHING MACHINE.—George Hoepner, Chicago, Ill., assignor to the Union Scale and Manufacturing Company of Sacramento, Cal. No. 648,617. Dated May 1, 1900. This invention relates to improvements in machines of that class which are designed to weigh powdered, granular or similar substances, and to deliver such substances in regular quantities into such receptacles as may be desired. It consists of a weighing receptacle, a yoke from which it is suspended having a scale beam projecting from it, a source of supply, means for delivering the material from the source of supply into the weighing receptable, a tilting diaphragm movable to form receiving chambers alternately upon opposite sides, fulcrumed bottoms connected and movable with the diaphragm, and notched segments fulcrumed on the axis of the bottoms, a spring-pressed latch adapted to engage the notches in the segment and hold the latter and the bottoms in either position to which they are moved, an electro magnet, an armature having a rod fixed to it and adapted to engage and lift the latch to release the segment and bottoms, and an electric circuit including a fixed contact and a contact carried by the scale beam whereby the magnet is energized when the weight in the receptacle causes the latter to move.

Obituary.

CHAS. P. HAUGHIAN, president Chrome Steel Works of Brooklyn, N. Y., died at his home, 149 Hewes St., that city, on the 2nd inst. A native of Armagh, Ireland, he had lived in Brooklyn fifty years—since his eighth year. He was the original producer of chrome steel in this country, and in 1865 founded the establishment in Brooklyn, known as the Chrome Steel Works, of which H. D. Morris has for many years been the San Francisco agent. Mr. Haughian had but recently returned from a visit to San Francisco and was arranging for an extended itinerary through Mexico. He possessed in an eminent degree the faculty of making and retaining friends, was a member of fourteen clubs and was deservedly held in high esteem by a large number of business associates. A brother and sister survive him.

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

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WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

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Write for Donaldson's Assayers' Slag Hammer.

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Of particular interest to HYDRAULIC OPERATORS and experienced QUARTZ PROSPECTORS.

American miners can pre-empt claims.

For further particulars write

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Atlin, British Columbia.

ANNUAL MEETING OF STOCKHOLDERS.

In accordance with the by-laws of that company, the Regular Annual Meeting of the Stockholders of the Jamison Mining Company will be held at the office of the company, Room 54, 120 Sutter St., San Francisco, California, on Monday, the 21st day of May, 1900, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. Transfer books will close on Saturday, the 19th day of May, 1900, at 12 o'clock M. and open again at 10 o'clock A. M. on Tuesday, the 22nd day of May, 1900.
SAM. W. CHEYNEY, Secretary.
Office—Rooms 54 and 59, 120 Sutter St., San Francisco, California.

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FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

FOR SALE.

Gold Placer Ground (U. S. Patent) in Western States.—The owners of a well-tested property of about 400 acres, suitable for working by dredging, being unable to work same themselves, invite full investigation with a view to sale of the whole or an interest. Reply K. B. C., Mining and Scientific Press.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

A BARGAIN.

3500 feet of 16-inch, 5 B. W. G. National Tube Works seamless pipe. Kimberly joints. Immediate delivery.

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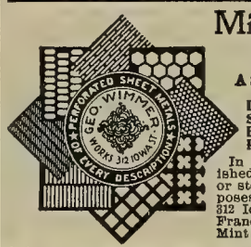
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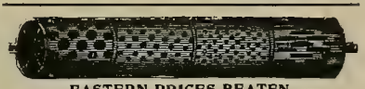
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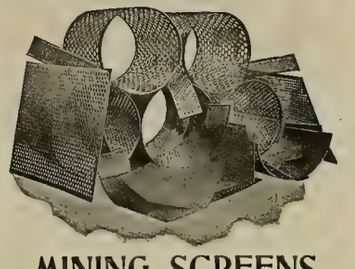
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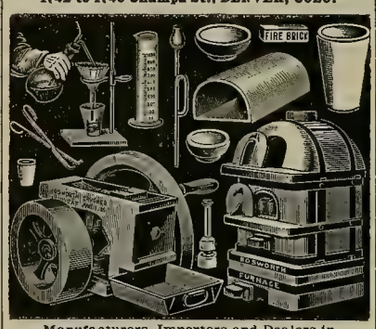
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ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the National Cons. Mining Company will be held at the office of the company, 773 Mission St., San Francisco, California, on MONDAY, the 4th day of June, 1900, at the hour of 8 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting.
GEO. W. FLEISSNER, Secretary.
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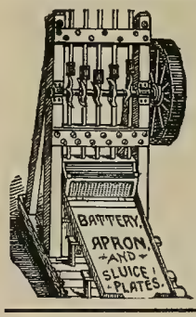
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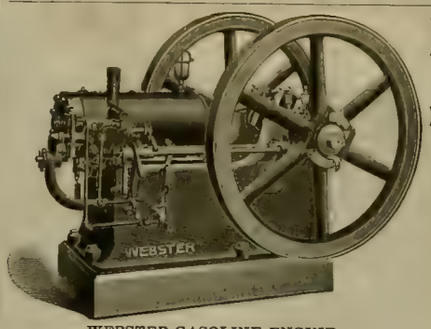
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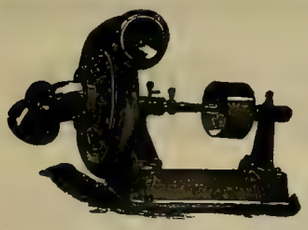
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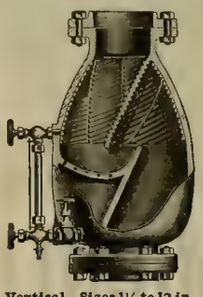
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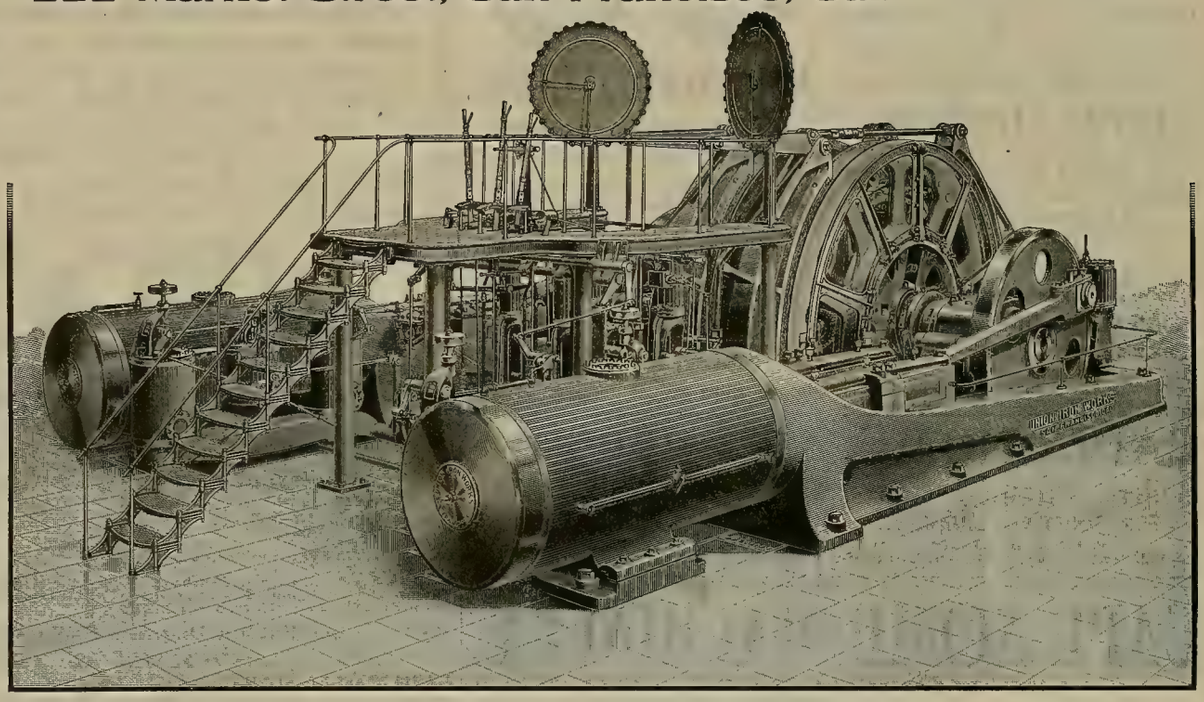
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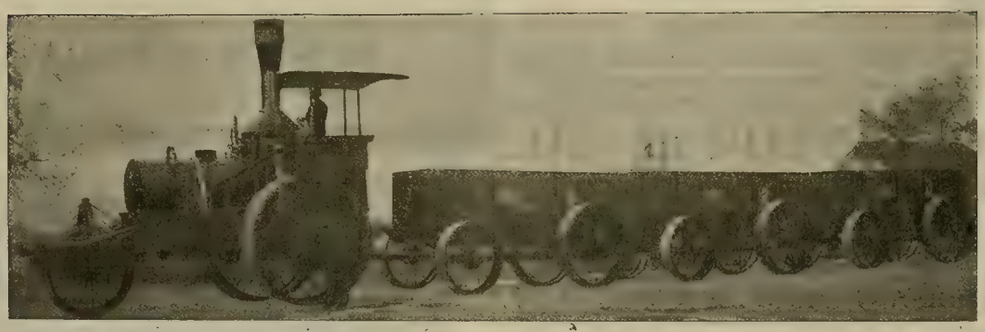
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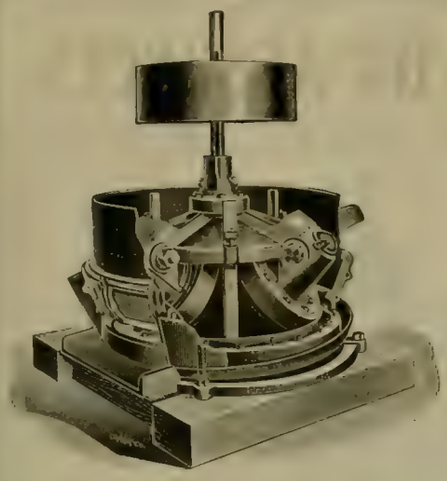
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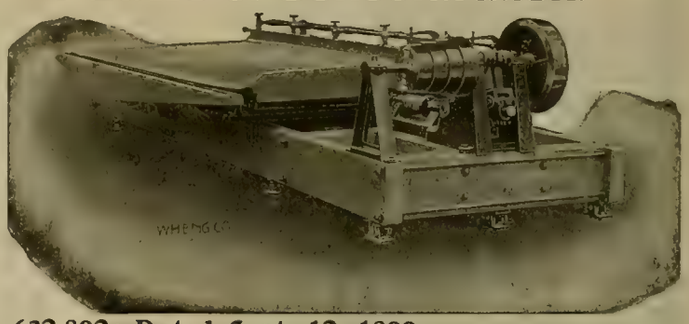
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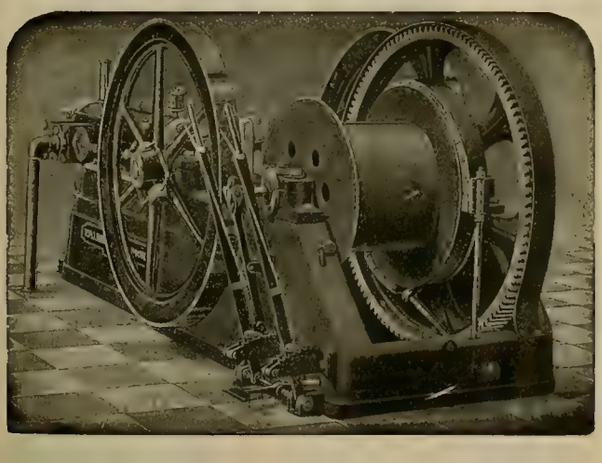


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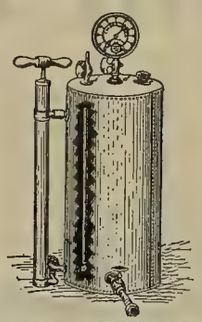
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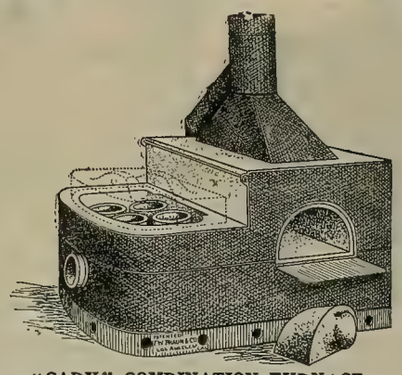
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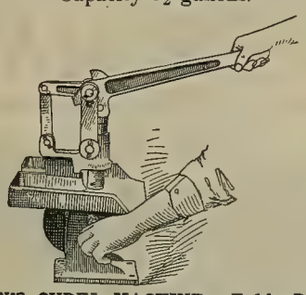
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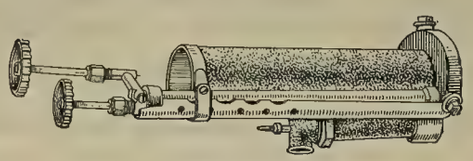
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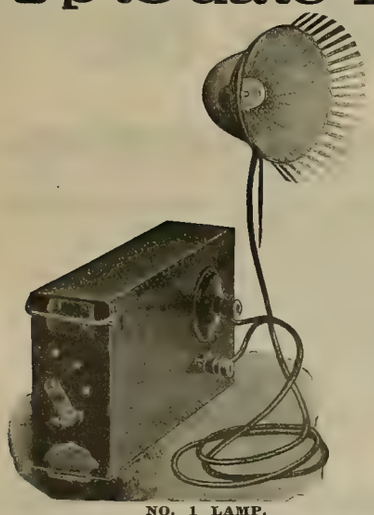
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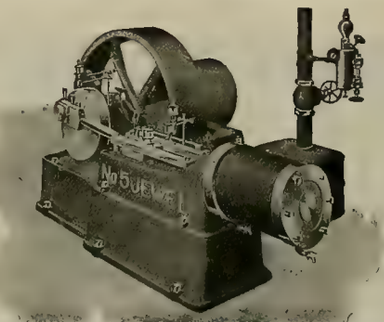
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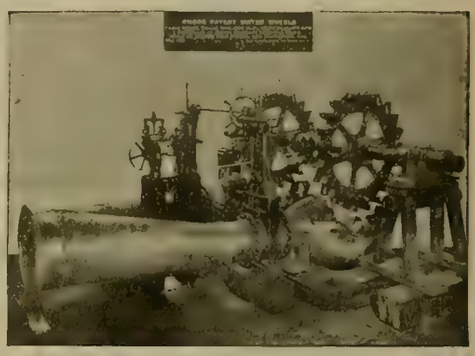
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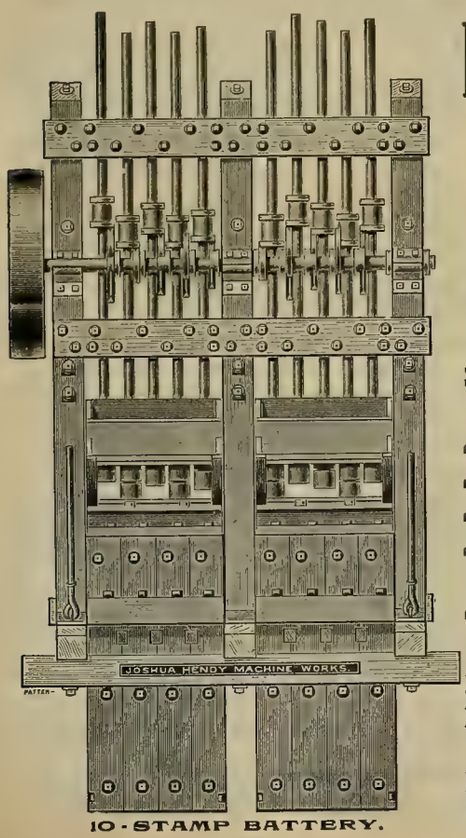


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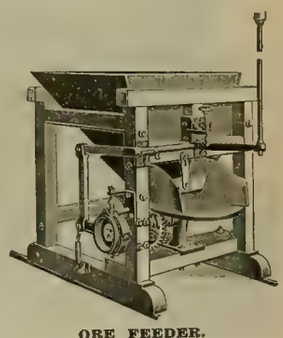
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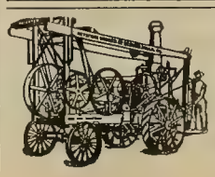
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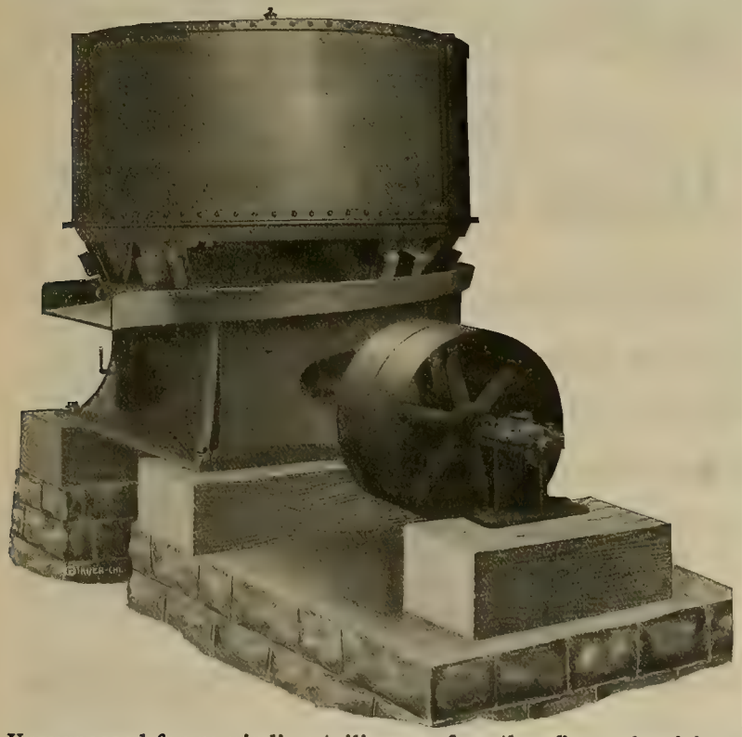
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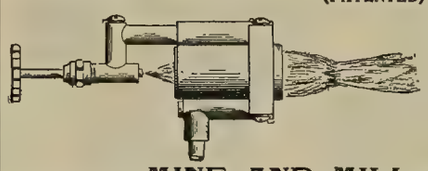
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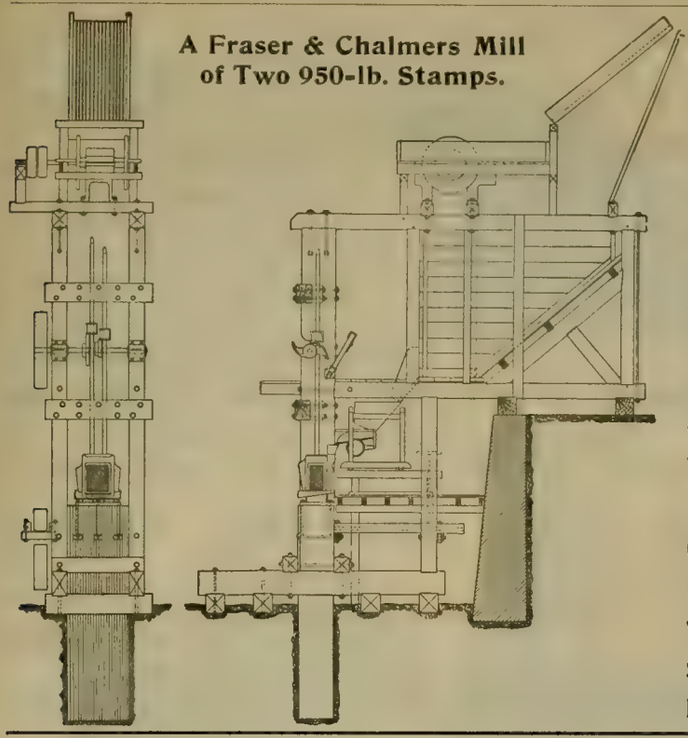
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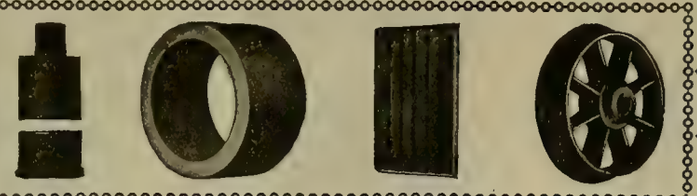


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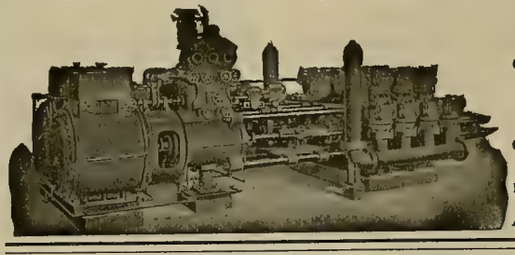
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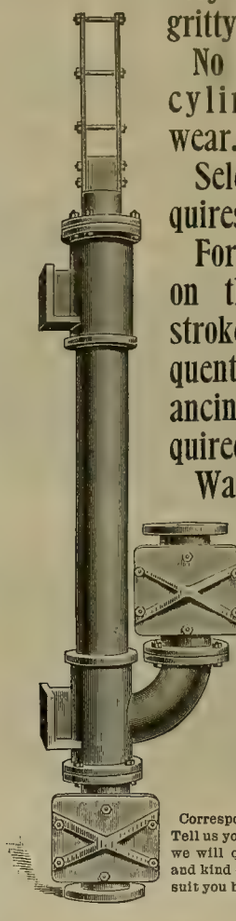
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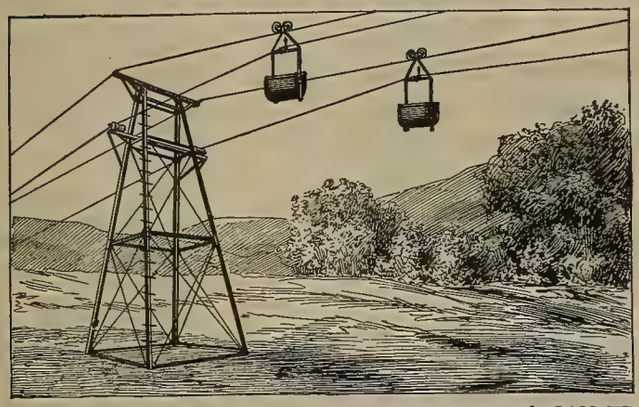
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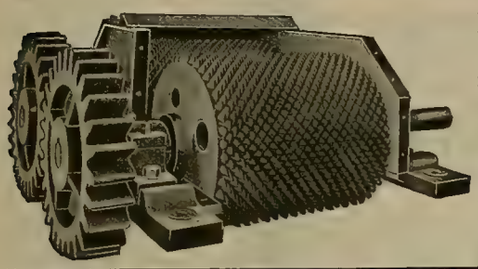


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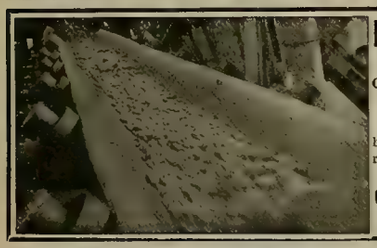


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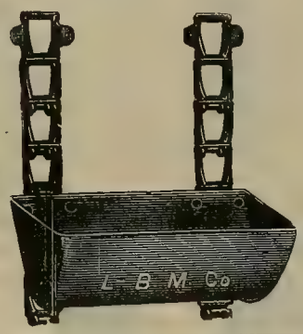
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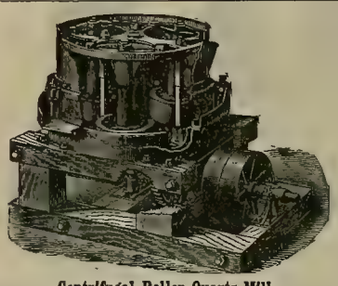


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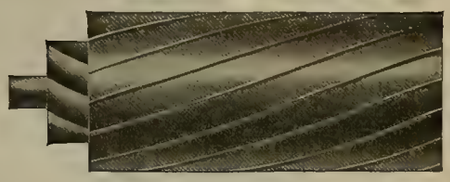
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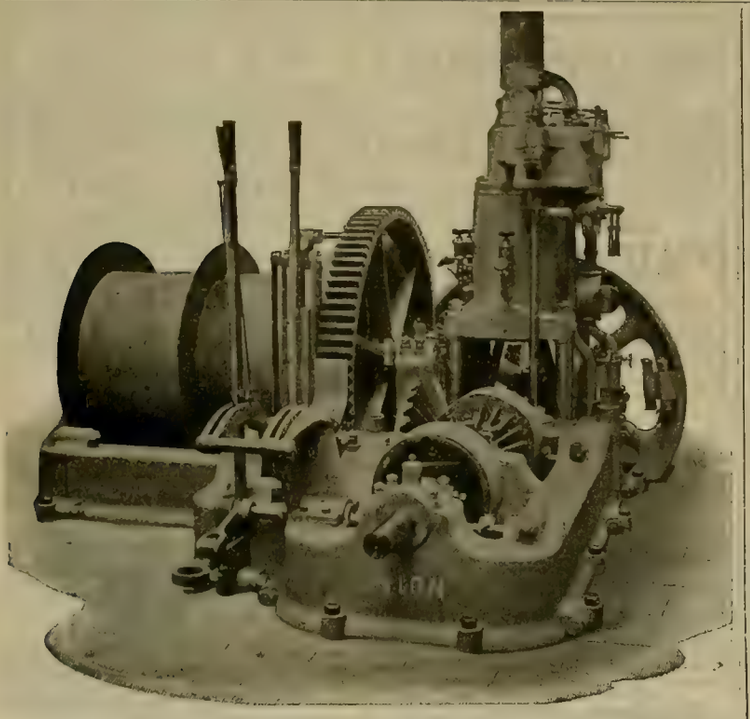
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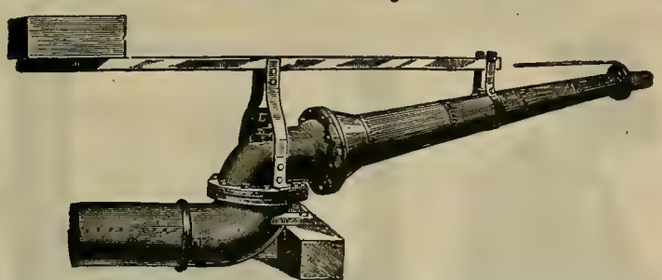
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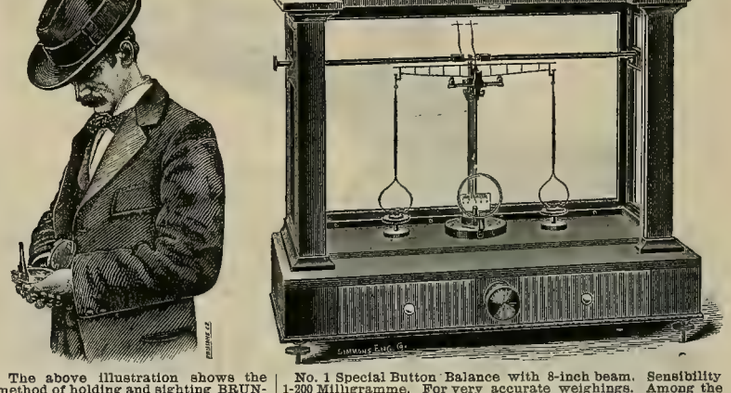


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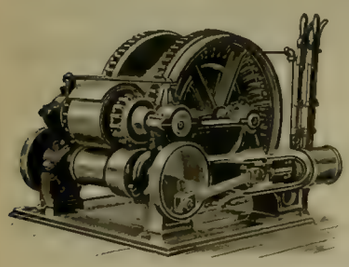
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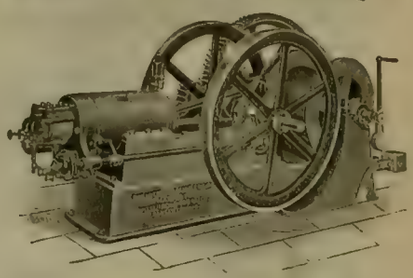
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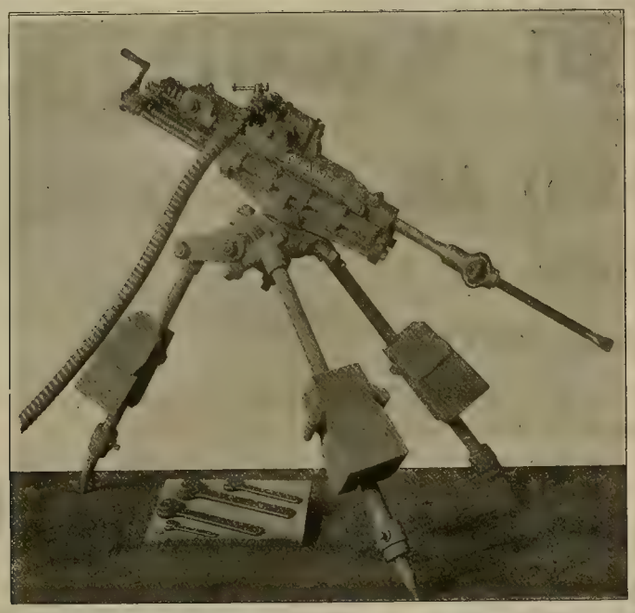
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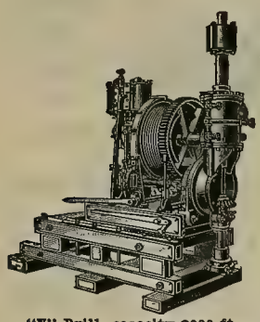
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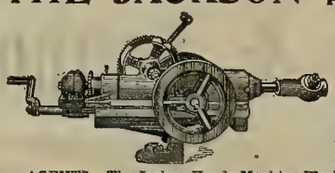
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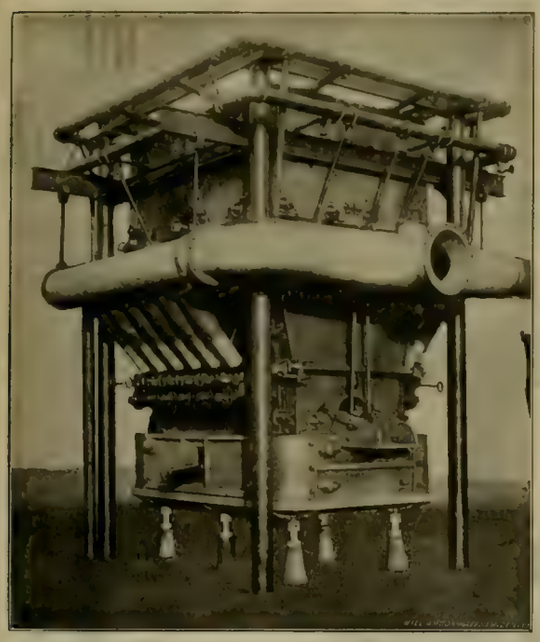


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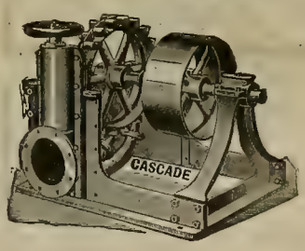
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Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of April, 1900, an assessment (No. 4) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of June, 1900, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 25th day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of May, 1900, an assessment (No. 5) of ten (10c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 11th day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—213 Jackson street, San Francisco, Cal.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 23) levied on the 2nd day of April, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. Heckmann, Trustee.....	64	2,000	$40 00
H. Heckmann, Trustee.....	65	2,000	40 00
H. Heckmann, Trustee.....	66	500	10 00
H. Heckmann, Trustee.....	67	500	10 00
H. Heckmann, Trustee.....	68	500	10 00
H. Heckmann, Trustee.....	69	500	10 00
H. Heckmann, Trustee.....	70	200	4 00
H. Heckmann, Trustee.....	71	200	4 00
H. Heckmann, Trustee.....	72	200	4 00
H. Heckmann, Trustee.....	73	200	4 00
H. Heckmann, Trustee.....	79	10	20
P. A. Wagner, Trustee.....	90	980	19 60
William Dieffenbacker.....	84	190	3 80
William Dieffenbacker.....	98	200	4 00
William Dieffenbacker.....	99	200	4 00
William Dieffenbacker.....	100	200	4 00
William Dieffenbacker.....	101	200	4 00
William Dieffenbacker.....	102	100	2 00
William Dieffenbacker.....	103	100	2 00
G. A. Hinckelbein, Trustee.....	9	1,000	20 00
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G. A. Hinckelbein, Trustee.....	23	500	10 00
G. A. Hinckelbein, Trustee.....	32	200	4 00

And in accordance with law, and an order from the Board of Directors, made on the 2nd day of April, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 28th day of May, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHAS. BOVONE, Secretary.

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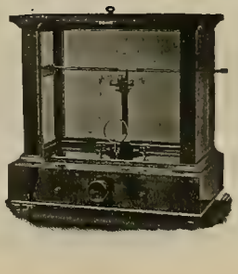
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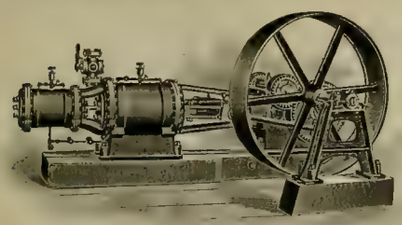
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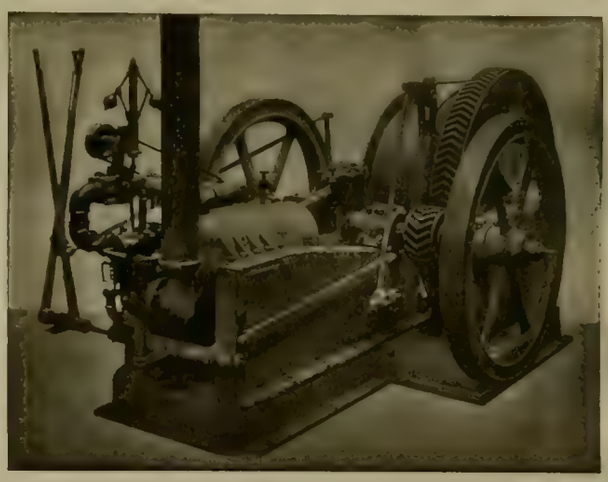
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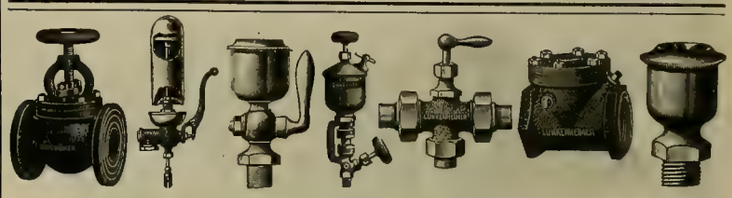
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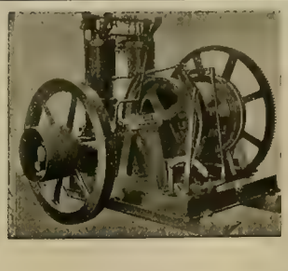


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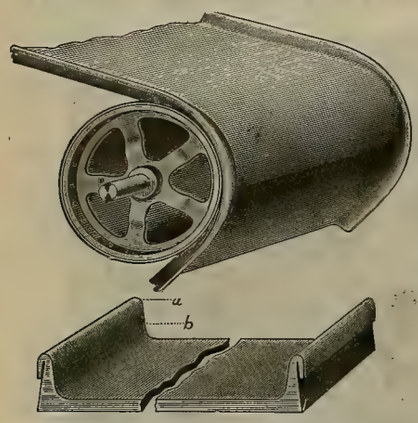
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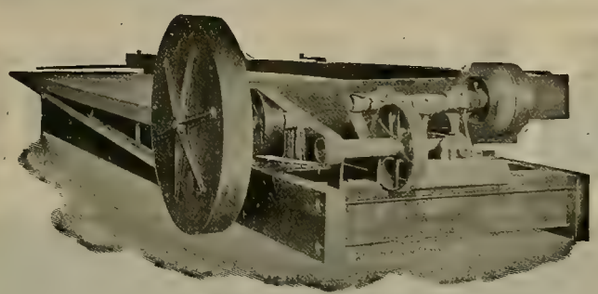
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No. 2079.— VOLUME LXXX. Number 21. SAN FRANCISCO, SATURDAY, MAY 26, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Producing Electrolytic Copper.

Starting with the ore, a preliminary dressing operation may or may not be required, depending upon the nature of the ore and the percentage of copper which it contains. Assuming the ore or mixtures of ores to be in such a condition as to readily yield up its copper in a smelting operation, the first step in the process is to produce a matte, or regulus. Depending upon the richness of this matte, one or more further smelting operations are necessary to bring it into a sufficiently pure state to render it fit for the subsequent electrolytic treatment—that is, the crude copper must be smelted up to a point at which it contains, say, 98% or more of metallic copper. The copper ores selected for treatment by this process always contain gold and silver in certain quantities; practically the whole of the precious metals are, during the process of smelting, washed down, as it were, from the ore by the regulus, and they tenaciously adhere to their association with the copper throughout the various subsequent smelting operations, and are still retained in admixture or alloy when the crude copper has been brought up to the required standard of purity of 98%. So little as 1 dwt. of gold and 2 ozs. of silver in a ton of the original ore are paying quantities, and it strongly appeals to one's admiration of the application of exact science to metallurgy when it is seen that these quantities represent, say, one part of gold in every 700,000 parts of ore and one part of silver in, say, every 30,000 parts of ore; that the recovery or loss of these apparently infinitesimal quantities of the precious metals should, in some cases, make the difference between a profit and loss to the refiner.

After the smelting operations alluded to the crude copper is ready for the purely electro-chemical treatment, but it is first necessary to cast the molten metal into plates of a convenient size and shape. These usually take the form of a rectangle about 3 feet long by 2 feet wide by 1 inch thick; they are suspended from copper rods resting on the top of a suitable tank, and have opposed to them in the same tank, but separated by a space of 1½ inches to 2 inches, thin copper sheets of like size, which are also suspended from copper rods similar to those from which the plates are suspended, care being taken that the two sets of rods are electrically insulated from each other. When the tank has been charged with a sufficient number of these pairs of crude copper plates and thin sheets, the tanks are filled with a liquid consisting of water having in solution the proper proportions of sulphate of copper and sulphuric acid to such a height that the plates and sheets are entirely submerged, with the exception of a strip along the tops. The system of rods supporting the plates is then connected to the positive pole of an electrical generator, and the system of rods supporting the thin sheets is put in similar electrical connection with the negative pole of the same source of electricity. The whole system being thus complete, a current of electricity passes from the plates through the intervening stratum of liquid to the surface of the sheets. A casual observer of such an apparatus would conclude that nothing was taking place within the tank, since there is an entire absence of noise and smell, and no evidence whatever of any motion; but nevertheless a remarkable series of chemical actions and reactions are constantly in progress so long as the current of electricity is passing, the ultimate result being that the whole of the copper contained in the crude plates is transferred by solution and deposition to the surfaces of the thin sheets, where it reappears in an absolutely pure form, all the impurities—including the precious metals—having been left behind at the surfaces of the crude plates, from which, as the plates gradually dissolve away, the impurities fall to the bottom of the tank in the form of a mud or slime. These slimes, containing all the gold and silver from the original ore in a highly concentrated form, are very valuable, and are either treated for the separation and recovery of the precious metals by the refiners themselves or sold to the bullion refiners. Here, then, we have a process which is now being worked on a colossal scale, recovering minute quantities of precious metals associated with copper with more than the certainty and accuracy of the assayer's crucible, producing simultaneously copper which for purity cannot be exceeded even by copper produced in a laboratory by the application of scientific methods of the highest degree of refinement, and at a working cost per ton of product not approached by older methods.



Bull Frog Cyanide Mill, Okanogan County, Wash. (See page 585.)



New Shaft House, Bull Frog Mine (Phantom Claim), Okanogan County, Wash. (See page 585.)

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THE simplicity of truthfulness is a merit in a mining prospectus, and more convincing than meretricious statements. Exaggeration exhausts itself and arouses instinctive distrust. Understatement is better than bombast for convincing those whom it is worth while to convince.

ON the 24th inst., this journal was forty years old, having been steadily issued since the first number appeared, May 24th, 1860. Probably nowhere is there a finer compendium of the progress of scientific mining and metallurgy than in the eighty volumes that have piled up during the two score years of its publication.

THE problem of barrier construction in the Yuba river, California, has been simplified and advanced by the additional appropriation in the river and harbor bill. The entire elaborate plan involves the expenditure of about $800,000, of which amount $500,000 is immediately available. The matter has been long and vexatiously delayed, but despite the multiplicity of their duties the U. S. engineers who compose the Debris Commission have steadily kept the intent in view of satisfactorily solving the difficult and unusual requirements of this special case, and are now in a fair way to give practical shape to the project.

IN San Francisco on the 15th inst. was decided an important point in State mining law by the U. S. Circuit Court of Appeals. The Gold Hill Mining Co., operating in California, incorporated under the laws of West Virginia, had successfully fought foreclosure in the lower courts, claiming exemption from the operation of a California statute, because of being a foreign corporation. A California statute enacted in 1880 provides that no mining incorporation in California may mortgage or incumber its property without consent of two-thirds of the stockholders. The Circuit Court of Appeals decides that this statute applies to foreign corporations doing business in California, arguing that it is contrary to public benefit to permit a foreign corporation to transact business in California under conditions more favorable or less restrictive than those applying to domestic incorporations.

Two Necessary Measures.

There is to be a Mining Congress at Milwaukee, Wis., on the 19th–23rd prox., which is expected to be of some importance to miners. The first session was held in Denver, Colo.; the second in Salt Lake City, Utah. The third goes farther east, we are told, to enlist the sympathy and attention of Eastern delegates in the great and necessary movement having for its object the establishment of a Cabinet Department of Mines and Mining. Anything that the Milwaukee gathering can do in that regard will be of just so much aid. Its two predecessors unanimously favored the idea. All that stands in the way is popular inertia. No one actively opposes it, but the project necessarily involves so much unanimity of action and the subject affects so extensive an area that it is a very slow process to get the requisite number of men to give the matter sufficient intelligent consideration to keep from becoming dormant.

For about five years this paper labored to get the sentiment of the mining world crystallized to the point of procuring the necessary legislation to make the idea of a cabinet Department of Mines and Mining effective, but we dislike to appear to have any hobby, and the pressing present demands upon our weekly space preclude possibility of more than occasional reference to this important subject. It is the province and the privilege, and should be the pleasure and the purpose of the Milwaukee meeting to push this project. That the idea will ultimately succeed is certain. It is now and has been for years a prime necessity. The arguments adduced by this paper for the creation of the department have been unanswered because unanswerable; but while there is a tacit acquiescence everywhere, every one seems waiting for further missionary work to be done by some one who has more time than the average busy man is ever vouchsafed.

Of equal importance is another matter that this paper has been urging for several years, but which has not met with the favorable unanimity of opinion accorded the one mentioned above—we refer to the revision of U. S. mining law, which is evolutionary or revolutionary, just as the miner may view it. We have repeatedly pointed out the weakness and the absurdity of our system of Federal mining law, and advocated a radical change in several Federal provisions, notably the adoption of vertical boundaries and the abolition of extra-lateral rights. This paper is always willing to accord to others the same degree of consistency that it claims for itself, and readily understands how conservatism, custom and prejudice honestly maintained may militate against the changes it proposes in our national system of mining law, but at times we confess to a slight degree of impatience at the untoward attitude and vexatious delay in securing what is so manifestly a necessity to the miners of America, viz., the abolition of the present requirements of U. S. mining law regarding discovery, assessment work, boundary lines, apexes and extra-lateral rights. The last lies at the root of all the evils that in that field beset the miner, and is the chief thing that should be abolished.

The Milwaukee congress may be able to help on this necessary work as in the case of the creation of a cabinet Department of Mines and Mining its Denver and Salt Lake predecessors pronounced in favor of the policy advocated by this paper regarding the revision of Federal mining law. Doubtless there will be much to take up the time and consideration of the attendant delegates, but it is our opinion that the Milwaukee Convention can do the mining industry great service if it shall succeed in advancing the two measures here suggested upon the calendar of the greatest tribunal on earth—public opinion.

THE exodus to the North that began in 1897, and is now as great as then, is depleting the mining States of many of their best miners, many of whom will not return. The great expenditure consequent upon this movement has already been commented upon; a more serious economic question is who shall take the places of these men, skilled in every department of scientific mining. Their departure is a manifest loss to the mining industry of the States from whence they go. The charm of "a new region" lures them from finer conditions existent in nearly every locality that they leave, and who will fill their places is an important problem. Those who swell the tide of travel to the far North do their talking and thinking in English; it may be that those who take their places will be different in some important regards. Of course, the work of development will go on, even if men of lesser intelligence are imported to fill the places of the departing American miners. There is enough of the turbulent element now in the mines of this west half of America, and it were not well to have the number of those whose education and instincts are not in harmony with our institutions suddenly increased.

OVER $125,000 was contributed to the relief fund for the families of the miners killed in the Pleasant Valley coal mines, Scofield, Utah. W. F. Colton, the company's treasurer, sends us a statement wherein Utah's State Mine Inspector, Gomer Thomas, denies a previous statement credited to him to the effect that the disaster was caused by the neglect of the Pleasant Valley Co. Much has been said as to the real cause of the dreadful occurrence, and if any of the comment will aid in any degree in the prevention of such disasters, it has not been said in vain. Apart from extraneous "causes," it is apparent that the disaster was due to a dust explosion. If the dust was fired, as stated, by the explosion of powder which should not have been stored underground, then negligence is justly chargeable to any corporation that knowing the circumstances would permit of such underground storage, a custom considered indefensible by many mining companies. The deaths were directly due to the carbonic oxide generated by the dust explosion, which deranged the admirable ventilating system of the mine, as such explosions usually do. The lesson to be learned from the sad affair is an oft-repeated one, viz., that dust is explosive whether it be in a mine, a flour mill or a factory, and that the safety of employes, no less than the imminence of disaster to property, requires universal guarding against so insidious and deadly a substance. If it can be more generally understood or realized that under certain circumstances dust may be as deadly as dynamite, there will be fewer repetitions of the Scofield horror.

A DROP of nearly 1 cent per pound in the price of lead during the month is noticeable. While the present price is considerably better than that of August 2, 1896, when it was $2.50 per hundred pounds, yet its sudden tumble from the $4.75 of a few weeks ago is dispiriting to producers. The cause of the drop is purely arbitrary; it is done solely because the controlling trust has the power to put the price up or down at the will of its directors. It is now characteristic of the managers of any of the great trusts to use their power to affect stocks, as in the recent case of J. W. Gates of the American Steel & Wire Co. There is no legitimate trade reason for the drop in lead. There is a steady demand, and the uses to which it is adapted are multiplying. Tariff protection is a good thing, but its good effects should be extended to the ore producers. When the smelter combine was formed one of the arguments was that it would reduce the cost to the consumer and permit the miner to get more for his ore. The result is just the reverse—the consumer is paying more, the miner getting less. The import duty is a help, but its helpful effect should be more mutual. Just now it is decidedly one-sided.

"TRUST" methods were recently well illustrated in the case of the American Smelting & Refining Co., in Colorado, which was unable after many weeks of controversy with producing miners to determine whether it could or could not pay $20 per ounce for gold, but twenty-four hours after the Guggenheims had announced their intent to pay that amount the trust managers discovered that they could also do so. The Guggenheims in Colorado seem to be useful as discouragers of hesitancy.

CALIFORNIA experience was repeated in Cripple Creek, Colo., last week. A miner coming off shift at the Independence mine was found to have several gold ore specimens secreted on his person, which he admitted having taken out while at work in the mine. He was arrested, but on trial was discharged, the court holding that no value was placed upon the ore stolen, and the witnesses for the defense were not able to swear that the ore in evidence was Independence ore.

Concentrates.

AN earthen dam 70 feet high should have a top width of 20 feet.

A 4-INCH iron pipe 10 yards long will hold about 160 pounds water.

A CISTERN or tank, inside measurement 9½ feet diameter, 12 feet deep, will hold 200 barrels.

THERE is no California State tax on the issue of certificates of stock in stock corporations.

A CALIFORNIA vara is 33.372 inches in length, a Mexican vara 32.992 inches, a Spanish vara 33.384 inches.

A 100-ACRE reservoir of water would require an inflow of ¾ cubic foot per second to offset loss by evaporation.

THE locator of a mining claim any time in 1900 has until Dec. 31, 1901, to do the required $100 assessment work.

ASPHALT LACQUER, laid on thin, is a good coating for iron pipe. Zinc oxide in it will color gray: red lead, brown.

BEFORE the South African war the annual consumption of giant powder on the Witwatersrand was about 250,000 cases.

ABANDONMENT or relinquishment of part of a mining location does not affect the right of the locator to the remainder of the claim.

BY chemical action in a cell electricity has been generated direct from carbon, but only as a laboratory experiment, not commercially.

THE Copper Queen Co., Bisbee, Arizona, purifies water for free use of its employes. After distillation it is pumped into tanks to cool.

THE specific gravity of the earth is 5.52765: that is, the earth weighs about five and one-half times that of a globe of water of the same size.

THE theoretical horse power supplied by one miner's inch of water is represented by the product of the head of water in feet and the decimal 0.0024147.

ELECTRICITY is a form that energy may assume while undergoing transformation from the mechanical or the chemical form to the heat form, or the reverse.

WHERE, in application for patent, the names of adjoining claims are designated, the mention should include unsurveyed as well as surveyed claims.

COLORADO mines and mining property are taxable. It is the customary rule to assess a producing mine or claim on one-fifth the gross proceeds of the preceding year.

THE forty-nine incorporated companies on the Comstock have levied assessments aggregating $80,000,000, and have paid in dividends an aggregate of $125,000,000.

THE amount of coal gas needed to maintain an ordinary fireclay muffle furnace need not exceed 10 cubic feet per hour for every 10 square inches of floor area of the muffle.

IT were idle to discuss any claims for circular shafts in metal mining in this country; the rectangular shaft has long been proved to be cheaper, and more efficient and convenient.

NO ATTENTION should be paid to vendors or makers of "electric belts" for the treatment or prevention of diseases. They impose upon the ignorance or credulity of their dupes.

MILLMEN give different grades for copper or silver plates to the concentrator. For full width plates 1¾-inch fall to the foot is recommended; 1 5/8 would probably work well for 16-inch width plates.

APPLICATION for patent does not absolve or relieve the claim owner from requisite annual assessment work. When the application is made the matter should be put through with all possible dispatch.

THE cheapest advertising is that which gives the largest amount of results in proportion to the amount expended. "Cheapness is not regulated by what you pay, but by what you get for what you pay."

THIS is not a "puzzle department," and catch questions are not considered. An honest effort is made to secure requested information on topics of general interest to miners, metallurgists, electricians and engineers.

PURE metals are tasteless; when united with other bodies the combination has a marked, usually an unpleasant, taste. All the metals are combustible, except the precious metals, gold, silver, platinum, osmium, etc.

WHENEVER or wherever, in the United States, local mining regulations or State mining law conflict in any way with United States statutes, the latter override all else. In mining matters the federal law is supreme.

THERE is probably more possibility of economical and satisfactory working in the gas engine than in any other form of power for the miner. It can produce and furnish power in regions almost inaccessible to any other form of applied energy.

DRY JIGGING requires very accurate sizing of the ore and great uniformity of the blast. Coarse ore requires currents of high velocity, when the great advantages of air jigging ordinarily disappear, except in arid regions where water is scarce and costly.

THE quantity of cyanide to be used per ton of ore must be determined entirely by intelligent experiment based upon the character of the ore and the experience of others as related at such length and with such minute detail by cyanide experts herein. Dilute solution is usually satisfactory. At the Sacramento, Utah, cyanide plant, about five ounces cyanide per ton of ore gives successful result.

BISMUTH is not an uncommon find in many parts of this region. Its profitable production is hampered by a European "ring," which controls output and production. It is mostly reduced in Saxony and London. It is quoted at $1.50 per pound for the sub-nitrate this week.

AN interest in a mining claim prior to the payment of any money for the granting of a U. S. patent for the land is merely a right to the exclusive possession of the ground based upon conditions subsequent; a failure to fulfill such conditions forfeits the locators' interest in the claim.

WHEN the proportion of silver in gold is 20%, the alloy is termed electrum. Besides silver, iron, rhodium, bismuth, palladium, platinum and antimony are found associated with gold. Rhodic gold, containing 40% gold, is found in Mexico. Bismuthic gold is termed maldonite. Palladic gold is known as porpezite.

IN the issue of April 28 appeared a misstatement in an article on chemical and physical properties of quicksilver, where on page 462 the statements regarding the weight of the flask and the amount of quicksilver therein used should, of course, have been 13 to 15 pounds weight for the flask and 76½ pounds weight of mercury therein.

IT is noticeable how much coal is allowed to remain unworked in order to serve as a support to the surface; but though repeated attempts have been made to devise a system of working which would render unnecessary the use of safety pillars, no satisfactory solution has ever yet been found, and the way in vogue a hundred years ago still prevails.

WHEN, in treating ore by the cyanide process, the consumption of cyanide is high, the cause may be determined by an analysis of the cyanide solution. For every part of cyanide rendered inoperative, a corresponding proportion of metal enters solution. Thus, one part by weight of iron consumes seven parts by weight of potassium cyanide.

WHEN less than 20 H. P. is required, it would hardly pay to install electric apparatus, for the smaller the plant the less its proportionate efficiency and the greater the relative cost of the electrical H. P. per hour. The better way, if practicable in such a case, would be to buy power. A plant with a theoretical capacity of producing 40 H. P. should be capable of furnishing 30 H. P. for practical work.

A MINING PROPERTY in California can not be attached or held for any debt contracted by its bonder or leaser if the owners have given due public notice that they would not be responsible for labor or supplies furnished such bonder or leaser. "Due public notice" would consist in stating the exact facts connected therewith, in writing, posting such notice conspicuously on the premises and publishing it in the nearest newspapers.

"THE principle of Archimedes" is that every body immersed in a fluid is pushed upwards by a pressure equal to the displaced fluid. Thus, a cubic foot of any substance, immersed in water, is urged upwards by a pressure of 62.4 pounds, the latter being the weight of 1 cubic foot of water. It follows that the weight of a body immersed in a fluid is diminished by an amount equal to the weight of the fluid displaced, and that, if the body is lighter than the fluid, it will float.

AT Lucknow, N. S. W., the Wentworth mill man's plan of placing quicksilver in the mortar is as follows: Three pieces of wood, 8 inches wide, 12 inches long, 2 inches thick, have thirty-two holes, 1 inch deep, bored in each of them. Each hole takes a 2-ounce vial. The mill man puts the required quantity of quicksilver in each little bottle, the battery man emptying one bottle in each mortar every hour, and putting it back in its hole upside down; each block of wood lasts eight hours—one shift.

NITRATE OF LEAD is the cheapest disinfectant known that fulfills its intent. It does not, however, prevent putrefaction. Chloride of lead is much more effective in all directions. It is made by dissolving a small teaspoonful of nitrate of lead in a pint of boiling water, then dissolving two teaspoonsfuls of common salt in eight quarts of water. When both are thoroughly dissolved mix the solutions. When the sediment has settled there will be two gallons clear fluid, which is a saturated solution of chloride of lead in water. A pound of nitrate of lead will make several barrels of the liquid, and costs about 70 cents.

THE best method of disposing of slag from a furnace is by granulation in a current of water, the slag being simply allowed to overflow from the forehearth into a trough with a rapidly flowing stream of water, being immediately granulated and carried away to a convenient point. Where water is not available the Nesmith slag trucks furnish a good method, consisting of two large pots on a truck so arranged that they can be swung out to the side and dumped on the outside of the track, the track being placed along the edge of the slag dump, and moved out as the dump extends.

IN giant powder over a year old the glycerine in it is liable to crystallize after that time, and the presence of a crystal in a stick of powder makes its handling dangerous. A scratching of that crystal, a jar of the stick, or a rubbing of one stick against another is likely to produce an explosion. The best powder is that about six months old. Before that time the glycerine is liable to be soft. There is also danger of getting new powder too warm and melting the glycerine. A drop falling an almost imperceptible difference will at once explode, and its concussion will be enough to explode all. Giant powder will sometimes burn without exploding, but the starting of a single drop of the glycerine it contains, either by exciting the crystal when it is too old, or the melted drop when it is too new, is what does the mischief.

IN chlorination, lead in the ore occasions an extra consumption of chlorine, though, of course, a heavy galena percentage in gold ore concentrates usually indicates considerable accompanying silver, which, in chlorination, is not wholly satisfactory. Unless a chloridized roast is used, lead, even in considerable quantity, does not materially affect the fineness of the precipitate, but the addition of even a small amount of salt to the roasting ore converts large quantities of lead into chloride, which, being dissolved and finding its way into the gold tanks, is there thrown down as sulphate, to the great deterioration of the gold precipitate, the result being a very base bar.

ANY ONE having made an invention in order to obtain a patent therefor must execute and file in the Patent Office an application for the same, together with $15, the first Government fee. An application consists of a petition setting forth the invention and praying for the grant of the letters patent, a specification describing the invention, specifically claiming the new features, a drawing illustrating the invention, and an oath which must set forth that the invention has not been in public use or on sale or described in any publication for more than two years before the date of the application, and for which no foreign patent has been granted for more than seven months. Upon the receipt of the application it is sent to one of the thirty-six divisions of the Patent Office to which by its nature it belongs. In due course it is taken up for examination to determine whether it is new and useful. If found to be new, an application is allowed the applicant. He is notified thereof and is given six months in which to pay the final Government fee of $20, and the patent is issued within three weeks after the final bill is paid. If the application is found to lack novelty a letter is written to the applicant, pointing out the objections and referring him to any prior patents or publications which may have a bearing on the case. A patent, if for a mechanical invention, is granted for seventeen years. Other patents are granted for three and one-half, seven and fourteen years, the Government fee being respectively $10, $15 and $30. To get things right it is well to employ a competent and experienced patent lawyer.

HYDROGEN is the lightest of known elementary substances, and therefore used as the unit of weight for all the others. The atomic weight of hydrogen is taken as unity and that of oxygen, for instance, as 16. Of equal volumes of the two gases under similar conditions the oxygen will weigh sixteen times as much as the hydrogen, whether it be pounds, ounces or milligrams. There is another property of the elements entirely independent of their relative weights, which is termed their "valency," or relative value. Thus if the nickel were taken as our unit of money value, the valency of a dime would be 2, of a quarter 5, and of a dollar 20. Among the elements, hydrogen is also taken as the unit value, and its valency is therefore 1. The valency of oxygen is 2; of silver, which is much heavier 1, and of zinc 2, which means that in chemical reactions where atoms are exchanging places 1 atom of oxygen or of zinc can replace two atoms of hydrogen or of silver. The electro-chemical equivalent of any metal is the weight of that metal that can be electrolytically deposited from solution by an ampere of current passing for one second. The figure 0.001118 is therefore the electro-chemical equivalent of silver. The chemical equivalent of any metal is its atomic weight divided by its valency. Thus the atomic weight of silver is 107.67, i. e., the vapor of silver is 107.67 times as heavy as hydrogen gas at the same temperature and pressure. The valency of silver is 1, therefore the chemical equivalent of silver is the same as its atomic weight. The atomic weight of zinc is 64.9, but its valency is 2. Its chemical equivalent is therefore $\frac{64.9}{2} = 32.45$. The electro-chemical equivalent of any metal is found by multiplying the electro-chemical equivalent of hydrogen by the chemical equivalent of the metal. Since the chemical equivalent of silver is 107.67 times as great as that of hydrogen, the electro-chemical equivalent of the latter will be $\frac{0.001118}{107.67} = 0.0000103835$. Having the electro-chemical equivalent of hydrogen, one can determine the electro-chemical equivalent of any other element by multiplying this by the chemical equivalent of that element: For instance the chemical equivalent of zinc is 32.45: its electro-chemical equivalent is therefore $0.0000103835 \times 32.45 = 0.000336944575$, which means that 1 ampere will electrolytically deposit zinc from solution at the rate of 0.000336944575 grams per second. This law is a definite one, and, knowing the electro-chemical equivalent of hydrogen, the atomic weight of any element and its valency, one can calculate the weight of that element that any current will electrolytically set free during any period of time. This law is the basis of all electro-metallurgical processes depending upon purely electrolytic action, but does not hold for those processes depending upon electrically developed heat as distinguished from electrolytic action.

Working Over An Old Dump.

Written for the MINING AND SCIENTIFIC PRESS.

At Plymouth, Amador Co., Cal., is now being worked over the old dumps of the Plymouth Consolidated M. Co., which is of double interest, first, because of the economical working of the mine in the first instance, and, second, because though the property was worked closely and economically, yet now another company finds value and profit in working over what was left when the ground was originally operated on with a record noted for fine work.

The Empire, Amador Pacific and Plymouth mining companies were consolidated after a production of gold to the amount of $2,500,000. Fifty-five dividends in all were paid, averaging $40,000 each, a total of $2,200,000. The average value of the ore in the last year operated was $7.59 per ton.

The principal mine consisted of an immense chimney of ribbon quartz, averaging 40 feet wide and 375 feet long. There were four shafts, three following the vein, the fourth vertical. The property was mined to a depth of 1700 feet. There were two mills, with 160 stamps, crushing 400 tons per day, being at that time the largest plant of the kind in California. The length of the ore shoot was about 800 feet, the hanging and foot walls of black slate, a black gouge accompanying each wall. The mine produced about 18,000 gallons of water per day. The ore was free milling, with 1½% sulphurets. The plant was destroyed by fire about ten years ago, when the owners turned their attention to even still more valuable property, and work was abandoned.

A description of the process employed by the old company will be of present interest in connection with an appended account of present method of working the old dump:

The ore, as it was raised from the mine, had an



Empire Dump, New Western M. & R. Co., Plymouth, Cal.

average assay value of $11 per ton, chiefly in the form of free gold. All the ore went directly to the stamp mills, of which there were two. The older and larger mill contained sixteen batteries of five stamps each, with one Frue vanner to each battery. The new mill had eight batteries of five stamps, and two Frues to each battery. The large mill was driven by Leffel turbine wheels, with a pressure of 80 feet, and a consumption of 600 miner's inches of water. The smaller mill was driven by "hurdy-gurdy" wheels with a pressure of about 550 feet, and a consumption of 150 inches of water.

At both mills the tailings from the stamps passed over about 20 feet of plates on their way to the Frues. In each set of plates the first or upper one was copper; the rest were so-called silver plates.

The bullion from the stamps was 800 fine in gold and 200 in silver.

The concentrates from the Frues averaged from 1½% to 1½% of the ore stamped. They very rarely exceeded 2%. I was unable to get the exact assay value of the concentrates, but it was said to vary between $100 and $200 per ton.

The concentrates were treated at the chlorination works at the rate of 100 tons per month. The capacity of the works was sometimes greater than this, but as the supply of concentrates was limited, it was not deemed advisable to work them up any faster.

Care was taken to keep the concentrates always damp until they were put into the roasting furnace. If this were not done, a decomposition of the pyrites would have begun, forming lumps which would not roast, and which consequently would have caused a loss of gold in the residues from leaching.

A Fortschaufelungsofen was used for roasting. Its dimensions, including firebox, were 12x80 feet. The hearth was one continuous plane, but the charges, of which there were three in the furnace at one time, were kept entirely separate. The furnace men called the three compartments the "drying," the "burning," and the "cooking" compartments. In the middle, or "burning" compartment, the ore was spread out very thin, and occupied about double the space of either of the other compartments.

The furnace was worked by eight-hour shifts, one man on each shift, and one charge was drawn and a new one added in each shift. The charges weighed 2400 pounds, and carried about 10% of moisture. The ore averaged 20% in sulphur, and just before the



Dump, Showing Crew and Method of Handling Material, New Western M. & R. Co., Plymouth, Cal.

sulphur ceased flaming (in the second division of the furnace) eighteen pounds, or ¾%, of salt was added to the charge.

The roasted ore from one shift was kept by itself on the cooling floor until a tankful (about four tons) had accumulated from a single man's shift; then that lot was worked by itself. This enabled the person in charge the better to control the roasting, for, if only one lot out of the three was bad it was presumable that the fault was with the workmen; but if all three were bad, the probabilities were that there had been a material change in the character of the ore, and the roasting process must be altered accordingly.

The vats for chloridizing the roasted ore were 9 feet in diameter by 3 feet in height, and were four in number. They were slightly inclined, so that they drained completely. The bottom of each tank was occupied by a filter about 6 inches thick, composed as follows: Light strips of ¾-inch wood were first laid in the bottom of the tank at intervals of about 1 foot. Across these strips were laid 6-inch boards, leaving cracks of an inch or more between the boards. On top of this loose floor were placed loose lumps of quartz, and on top of this again finer quartz material, until a total depth of about 5 or 6 inches was obtained. Finally this "sand filter" was covered by another loose floor, the boards lying crosswise to the loose floor beneath, and pretty close together. The upper floor was intended merely to furnish a shoveling furnace, so as to permit the removal of the leached ore from the tanks without disturbing the filter.

The ore to be chloridized must be damp (about 6% moisture). The working test was, to take a handful



Reduction Plant, New Western M. & R. Co., Plymouth, Cal. (Old Empire Mill Site.)

of the ore and squeeze it, then open the hand, and if the lump immediately begins to crumble and fall apart (not run) the ore has the requisite amount of moisture.

The damp ore was screened into the tanks, so that it would lie as loosely as possible, and facilitate the penetration of the chlorine gas. A coarse screen of ½-inch mesh was used for this purpose.

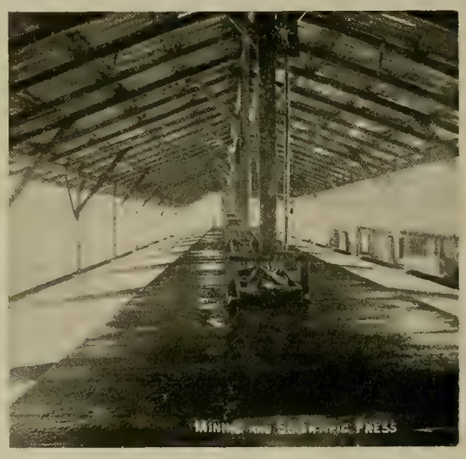
The tanks were filled up to within about 3 inches of the top. This was to insure that the entire contents of the tank would be covered by water in the subsequent leaching, otherwise there would be great difficulty in washing out all the soluble gold.

As soon as the tanks were filled as stated, they were ready for the introduction of the chlorine gas. This was introduced into the bottom of the tank from two opposite sides, and was continued until ammonia held over the ore gave off dense fumes of ammonium chloride. This usually took about four hours. When this point was reached, covers were placed on the tank and the cracks were luted with a mixture of leached ore, bran and water. The gas generators, of which there were two employed at one time in charging a tank, were allowed to work on until they were exhausted; then they were disconnected and the holes in the tank plugged.

The tank was usually charged with gas in the morning, and was left standing for two days. On the third day the ore was leached. The tank was first filled with water, and allowed to stand a few minutes, so that the water could penetrate all the ore. If no more water was absorbed, the liquor was first drawn off at the bottom, care being taken to keep the tank full of water during the entire operation, which took from four to five hours.

In charging the tank, a gunnysack was laid on top of the ore, where the wash water was afterward to be introduced, in order to better distribute the water in the tank and prevent its washing and packing the ore.

The liquor from the leaching vats was conducted to settling or storage tanks, and about forty pounds of sulphuric acid (66° B.) was added. Experience had shown this addition of acid to be advantageous in obtaining a clean product in the subsequent precipitation. The chemical reaction was, however, by no means clear. (To this statement an exception must be taken, as sulphurets sometimes contain considerable lead, almost always more or less. By adding



End View of Canvas Plant Interior, New Western M. & R. Co., Plymouth, Cal.

sulphuric acid, the lead is precipitated as sulphate, and the liquor, freed from lead, can yield no plumbic sulphate with the gold when precipitated by sulphate of iron, as it otherwise would; hence a cleaner bullion. In one chlorination works, if not more, the sulphate of lead obtained from the settling or "base" tanks, always containing some gold, is collected and sold, and a considerable sum realized for both the lead and gold.) It was usually allowed to stand for twenty-four hours, but two hours were quite sufficient. It was then run into precipitating tanks, and the gold was precipitated by a solution of sulphate of iron. The iron solution was added until, after stirring, a further addition produced no purple color. After the gold was precipitated, it was allowed to stand two or, if convenient, three days to settle; then the supernatant liquor was drawn off with siphons into a second settling tank, where any gold that had been drawn off by the siphons had a second opportunity to settle. The liquor stood in this tank until it was necessary to run it off to make room for another charge. Very little gold was found in this tank, and it was therefore only cleaned out once during the year. In the meantime, fresh liquor had been run into the precipitating tanks upon the gold already precipitated there. In this way, the gold was allowed to accumulate until the semi-monthly cleanup. Except when it was necessary to have them open, the precipitating tanks were kept covered and locked.

In making the cleanup the supernatant liquor was siphoned off, the gold gathered up and placed in a filter of punched iron, lined with a sheet of ordinary filter paper, and washed with water until all the acid and iron salts were removed. It was then dried, melted in crucibles, and cast into bars.

The works extracted from 95% to 96% of the assay value of the concentrated sulphides. Two men, on day shift, attended to all the work of handling the ore after it was washed (the leaching, etc.). The head man received $3, the other $2.50 per day. Owing

to the limited amount of ore allotted to the works, only three tankfuls were leached every four days. The men, however, were employed steadily. The sulphate of iron was manufactured on the spot. For this purpose an ordinary wooden tank about 4 feet by 4½ feet, standing outside the building in the open air, was used. The tank was kept full of water and supplied with old scrap iron ad libitum, and for each charge to be precipitated about forty pounds of acid was added to the tank.

The precipitating tanks, which were of wood, were protected from the action of the acids by a coating of "paraffine paint."

I append an itemized statement of the cost of handling the ore. The basis of figuring is 100 tons of ore per month of thirty days. Consumption of chemicals in the leaching department, twenty-four days each month:

Roasting—		
Three men at $2.50 per day for 30 days	$225 00	
1¼ cords wood at $4.25 per day for 30 days	223 13	
54 pounds salt at ¾ cent per day for 30 days	12 15	
		$460 28
Generator—		
The charge is manganese 30 pounds, salt 34 pounds, sulphuric acid 60 pounds; therefore, for two generators:		
Manganese, 60 pounds per day, 24 days, at $47 per ton	$33 84	
Salt, 68 pounds per day, 24 days, at $15 per ton	12 24	
Acid, 120 pounds per day, 24 days, at $60 per ton	86 40	
		132 48
Acid for settling tanks (40 pounds), and for sulphate of iron manufacture (40 pounds), 24 days		57 60
Wages of leachers, at $5.50, for 30 days		165 00
Salary of foreman		125 00
Total		$940 36

Or, per ton of concentrates, $9.40⅗.

To this price per ton should be added for assaying, repairing, supplies, insurance, taxes, water, interest on capital invested, deterioration of plant, and proportion of general expenses and superintendence, about $4 additional per ton, making the total cost of working $13.40.

Altitude (aneroid reading)	1,050 feet.
Length of ore shoot	800 feet.
Length of south shaft on incline	1,280 feet.
Depth of ore shaft vertically	1,100 feet.
Vertical depth reached in mine	1,600 feet.
Vertical depth of north shaft	1,020 feet.
Quantity of water raised in 24 hours)	18,000 gallons.
Character of hanging wall	Black slate.
Character of foot wall	Black slate.
Kind of powder used	Safety nitro, No. 2.
Cost of mining per ton (total mining and milling, $3 07)	$2 34
Cost per foot of shaft (labor and powder)	$18 00
Number of feet timbered	All.
Kind of timber	Round pine.
Cost of timber	$2 to $3 per log.
Length of ditch built	160 miles.
Cost of transport of ore	Nothing.
Number of stamps	160
Weight of stamps	80— 750 lbs. each. 80—1,000 lbs. each.
Drop of stamps	5 to 6 inches.
Drops per minute	90
Duty of stamps (tons in 24 hours	2
Kind of shoes and dies	Iron.
Size and character of screens	Round punched, corresponding to No. 8.
Kind of feeder	Tullock's and Hendy's.
Kind of concentrators	Frue's.
Character of ore	Soft quartz and slate, free milling and concentrating.
Percentage of sulphurets	1½
Value of sulphurets per ton	$125 to $200
Cost of milling per ton	$0 39
Cost per ton of working sulphurets (already embodied in cost total)	$11 33*
Percentage of value extracted from sulphurets	92 to 95
Kind of roasting furnace	Reverberatory.
Head of water used for power	561 to 550 feet.

* To this cost must be added its proportion of incidental expenses.

Recently the New Western Mining & Reduction Co. was organized and the Plymouth Consolidated dumps—vast piles of slate and quartz hoisted from the Pacific and Empire mines, Plymouth, Amador Co., during their palmy days and comprising over 250,000 tons—are now being worked over for the values on a large scale with equally interesting results.

The reduction plant consists of four 5-foot Huntington mills with classifiers, Wilfley and Woodbury concentrators, and extensive canvas plant, all operated by water taken from the Hayward ditch and pipe line under a head of 572 feet.

The dumps are attacked at their base with a double track and switch, running in sufficiently to square the face, when a temporary chute is placed, allowing greater portion to drop to car, though of course varying according to height and solidity of portion worked.

The material is then trammed a distance of 250 feet to an hydraulic elevator which lifts the car and cage, a total weight of 3100 pounds, a distance of 32 feet to bins where load is dumped onto inclined grizzlies, the bars set at 1¼ inches, the rejected portion passing onto an 8x12 Dodge rock breaker below, jaws of which are also set at 1¼ inches, the whole arrangement so designed as to give a fine first product to mills, thus relieving them of considerable duty and increasing capacity.

From the bins the product is automatically fed by four Challenge ore feeders to the Huntington mills, running at sixty-five revolutions per minute and employing a surplus of water with coarse screens, the object being direct concentration, so that sliming and unnecessary crushing is avoided.

Slot screens from 12 to 20-mesh (Nos. 1, 3, 5) are used, varying with character of dump encountered, using the coarsest on the low grade slate and gouge; these screens last on an average twelve days.

From each mill the pulp flows to a hydraulic classifier set directly under discharge and delivering two grades of material, the coarse product going to the concentrating tables, while all fines from overflow lead to a tailings wheel, 16 feet in diameter, where a lift of 14 feet is made onto the canvas plant, running parallel with main building.

The classifiers are of a well-known type, having a fixed pipe and T at bottom with a constant upward flow of clear water through which the coarser and heavier particles of pulp drop, while the fines go to an overflow. Each classifier has a centerboard, breaking the flow and giving a downward current, while the fixed head of water to each permits of separate regulation.

One Woodbury and two Wilfley concentrators receive and handle the coarse product from classifiers, this pattern of shaking table being well adapted for such material, giving a clean product with slight loss and requiring little adjustment or repairs.

The canvas plant building, 156 feet long and 20 feet wide, consists of twenty-four inclined tables each 12 feet wide and 7 feet long, with a grade of 1½ inches to the foot. A walk-away the full length of center of building gives a clear observing and working space, from which the tables are periodically washed by a hose with a flat spray. The washings delivered onto a Wilfley concentrator are then cleaned to a high grade shipping product.

The capacity of the four mills in twenty-four hours is 125 tons; of this the concentrators handle eighty tons, the balance going to the canvas plant.

One head mill man with helper attend to each twelve-hour shift, the entire stoppage for oiling and repairs for twenty-four hours being thirty minutes.

One man on twelve-hour shift attends canvas plant, making a round of washing tables every hour.

The principal values in the dump are contained in the sulphurets, averaging 1¾%. All free gold present is caught with the concentrates, which are shipped to the Selby Smelting Works, Vallejo Junction, Cal., in carload lots for treatment.

During the last six months the average cost of working the dumps has been as follows:

THIRTY DAYS MILLING 3750 TONS.

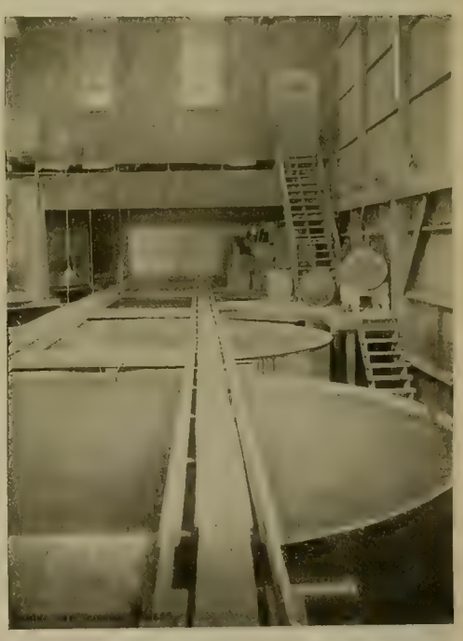
Dump work, delivering to mill	$ 375 00
Milling, including canvas plant	510 00
Water	240 00
General expense	110 00
Total	$1235 00
Total cost per ton	32 cents.

The above cost per ton is believed to be as low a figure as any at which any gold-bearing material has been treated in quantities. In several instances Supt. T. C. Woodworth has personally superintended the erection and operation of plants on tailings and dumps, both cyaniding and concentrating, much of the practical idea of erection and subsequent treatment of the dumps by the present plant originating with him. To the president of the company, F. J. Moffitt of Oakland, Cal., is due much of the credit of organization and carrying on the business.

A Great Mining Area.

Written by CLARENCE KING.

The mountain system that borders the Pacific from Cape Horn to the Arctic sea covers an arc of nearly half of the great circle of the globe, and has its widest expansion about the latitude of San Francisco, where it is 1200 or 1400 miles wide. That mountain system ranks next in physical importance to that of the east and west system which traverses Asia and Europe, but unlike that system it is an empire of mines, and its geology, besides having a high abstract interest, lies at the basis of the knowledge of minerals for this immense area. The quantities involved in this system of the Cordilleras are great almost beyond belief. They involve the superposition of strata amounting to over 120,000 feet in actual measured thickness; they involve a history from very near the dawn of geological history, absolutely until to-day of enormous dynamic action and effect. And this dynamic action has consisted in the upheaval, in the depression, in the crushingand folding together, and in the dislocation of enormous blocks of this great territory. The sedimentary series, which have been said to amount to over 100,000 feet, are derived from the older rocks in their immediate neighborhood. So far as we have been able to see, these sediments have never traveled to very great distances. Sometimes a series of strata, amounting in all to 40,000 feet, have been piled up consecutively and continuously and without break; but all these series of various episodes of sedimentation have ended in the destructive dynamic period, and they have been crushed, uplifted or depressed, and then the process of sedimentation has begun under new terms. These dynamic events which punctuate, as it were, the history of these Cordilleras, are due undoubtedly to the unbalancing of the forces of gravitation and equilibrium. It is very well known to geologists that if you load any area with a heavy mass of sediment that area subsides; that if you unload any area, that area will rise. Consequently, whenever an area rises near an area which is stable or is sinking, there is a dynamic strain, and if that strain passes cohesion, passes the point of the elastic limit of the rocks, or the cohesive limit, they are eruptured by these tremendous strains, and the action usually ends in the eruption and readjustment of equilibrium and eruption of melted matter from the subjacent area. It is in these periods of stress and strain to which the rocks and whole distances, and enormous areas and ranges and whole mountain ranges have been subjected that the crushing, straining and fracturing and fissuring takes place, which is the birth of a mining district. I do not mean to indicate that every crushed area, or every fissure or block of country is the birthplace of a mining district, but because mineral veins owe their origin to two processes: one is the fissuring of the rocks, or the solution of soluble rocks on lines of fissure, and the second process is the deposition of mineral matter on, in, along and near these fissures. So that a mining district requires the two periods of action; I mean a block of country requires the two classes and periods of action to bring it from an amorphous mountain pass into a mineral district. These periods of crushing have never occupied a very great part of the geological history; they are sudden, con-



Leaching Tanks in the Albemarle Mill, Near Bland, New Mexico: Stairs Lead to Precipitating Room.



Crushing and Drying Room, Albemarle Mine of Cochiti G. M. Co., Near Bland, New Mexico. (See page 584.)

vulsive episodes which follow periods of accumulation of strata, periods of upheaval and periods of depression; but, short as they are, they have ended in deluging enormous tracts of this Cordilleras system with eruptive rocks, molten when they came out, and which have cooled under or upon the surface. There are fields of these eruptive rocks which cover many thousands of square miles; there are other fields which are extremely small. And as I say, these periods began in the earliest geological ages, and have gone on practically to the present.

The study of these rocks which have been erupted in these various periods has resulted in a fine classification as to species, and in a certain measure as to origin and also to a rougher classification in time; that is to say, rocks which we know to be earlier than the dawn of life, which we will put at the base of the Cambrian, are of a different class from those which are erupting now from present volcanoes. They have shades of difference in texture and in composition, and in the relative proportion of their different elements, but chiefly their distinction is one in decompositions; that is to say, it is very rarely we get from the earliest periods any form of lava which is as fresh and as new as these which are being erupted now. They have undergone chemical decomposition more or less. So that in a general rough sort of way the ocular examination of a district of erupted rocks usually gives rise to a fairish judgment of about when that district was built.

Mining on the California Gold Belt.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS, Assistant State Examiner of Mines.

That portion of the gold belt of California known as the mother lode has furnished a field of geological study ever since its discovery. Many geologists have given it their attention and a great deal has been published concerning it that is valuable. Among the most valuable contributions to our knowledge of this mineral belt are the writings of Dr. Rossiter W. Raymond and Ross E. Browne, and later those of H. W. Fairbanks, Ross Browne, and, more recently, the exhaustive reports and maps of the United States Geological Survey. The various reports of the State Mining Bureau have also furnished a large amount of valuable technical and statistical information on this subject. In view of the vast amount of information heretofore published concerning the geology and mines of the mother lode, it was with the feeling that the subject was worn somewhat threadbare that the writer undertook the reinvestigation of this important field.

Since the publication of the thirteenth report of the State Mineralogist in 1896 no publication has been issued by the State regarding the progress of work in the counties along the mother lode, though this period has been one of marked progress, and also of innovation, in these mines. Old methods have given place to more modern ideas, and still more radical changes may be looked for in the future. An era of deep mining has commenced which can only be successfully carried on by the adoption of modern mining methods and improved machinery and closer attention to the treatment of the ores. Already mines which in former years were worked in a more or less primitive manner, under many disadvantages and at an expense considerably above that now necessary to accomplish given results, after being long abandoned have been reopened and are again profitable. This has been made possible by the reduced cost of labor in later years; by the superiority of nitro powders over the black powder formerly employed in all mining operations in this State; by cheaper and better mining supplies generally, and, in the best equipped mines, in no small degree by the improved modern hoisting machinery and mining methods.

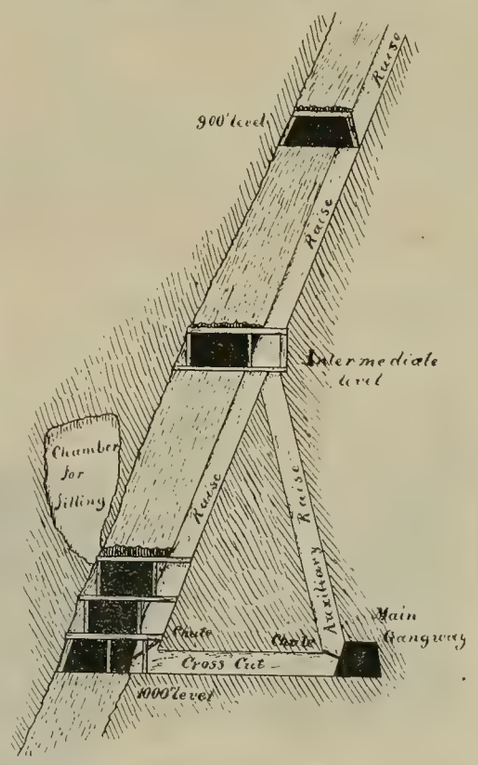
The marked mechanical success attending very deep mining elsewhere, notably in the Lake Superior copper mines and in South Africa, has undoubtedly been a great incentive to the miners of California to emulate these efforts, and we find vertical shafts being sunk to a great depth, far below anything heretofore attempted in California mines.

There are mines in Amador and Nevada counties operating to a depth of 2500 feet through old inclined shafts, usually sunk to conform approximately to the changing incline or dip of the veins, and there are numerous veins having inclined shafts in several counties which penetrate to a depth ranging from 1500 to 2000 feet; but the managers of these properties realize the importance of having shafts sunk at a uniform angle, either vertical or inclined, thoroughly equipped and provided with the best hoisting machinery in order to reduce the cost of mining, for in nearly all the larger mines it is known that there are immense bodies of ore which are too low grade to pay by the old methods of mining, but which, with modern equipment and methods, would yield large profits to owners.

A policy which obtains almost universally throughout California mining districts is that of demanding immediate returns from development. While this, of course, is very desirable, it often ultimately works to great disadvantage to the owner, and the manager is so seriously handicapped that he is unable to make substantial headway. In some mining regions this condition of affairs is not a great drawback to the success of operating the property, but in the mines of the mother lode it is undoubtedly a short-sighted policy. The reason of this will become apparent when it is understood that with few exceptions the ground is heavy—often swelling—crushing the heavy timbers. The usual practice is to drive a crosscut or drift from a station at the shaft to the vein channel. This may or may not at once encounter ore; if not, a drift is driven along the fissure, which must be timbered in the most substantial manner. These drifts are usually not less than 7 feet high, 4 to 5 feet wide at the top and 7 to 8 feet at the bottom. These dimensions are all inside the timbers. It usually makes little difference whether the cutting is in ore or not, the ground is generally heavy. The fissures are often 10 to 40 feet wide and the miners—of Amador particularly—are well acquainted with the danger, difficulty and expense attending this kind of mining. As soon as pay rock is encountered it is hoisted and sent to the mill and the drift continues, while overhand stopes are started and development proceeds as in mines elsewhere. It may be several hundred feet to the limit of the property, and is often over 1000 feet, and this heavy swelling—sometimes running—ground must be kept open until the entire level has been explored and the ore all extracted and sent to the surface. An idea of the character of some of this ground may be gained from the statement that in certain instances a drift of usual size being driven a distance of 200 feet, at the rate of 5 or more feet daily, under contract, cannot be completed before it becomes necessary to return to that portion first driven for the purpose of retimbering. The timbers employed in holding ground of this character are usually 20 to 30 inches in diameter, and it is no uncommon thing to see these immense logs split, crushed and broken as though they were incapable of offering any resistance to this all but irresistible force.

The advisability of cutting the main gangways in the hard rock of the walls, either foot or hanging, and reaching the vein by a system of crosscuts is earnestly advised. This has not as yet been attempted, but its feasibility and desirability can readily be appreciated when the character of the main fissures, as above explained, is understood.

These main gangways, being driven in, say, the foot wall, should have crosscuts extending at right angles to the direction of the main gangway. These are disposed at stated intervals for the purpose of prospecting the fissure and to render accessible the ore discovered. Raises should always be put through, connecting with the level above, before stoping is commenced. Very often this is neglected, owing, as previously stated, to the haste to realize on



Method of Working Veins in Swelling Ground.

the ore as quickly as possible. When the raises are not put through, the heavy timbers must be hoisted up through the raise into the stopes by means of block and tackle at great expense of time. If the raise were through, the cost of handling these great timbers would be very materially reduced by lowering them through the raise from the level above.

With the lateral drifts and crosscuts completed and the drifts driven on the vein, with raises through to the next level above, the work of stoping can be carried on at as many points as may be desired, and the ore once out the level may be abandoned and in a few weeks, or months at most, the greater portion of the excavation made on the vein will collapse and be closed up forever. This works no harm or inconvenience, as the main lateral drift remains open.

When operating in this manner filling for the stopes may be taken from the hanging wall by driving an inclined raise into it and opening out a chamber. The rock broken in these chambers will pass by gravity down into the stopes beneath and fill them, little or no shoveling being necessary. This method of mining and filling, when properly carried out, will prove more safe and far less expensive than the methods heretofore employed in mines of the California gold belt. These filling chambers may be worked with hand or small power drills, as seems most advisable. One of the greatest items of mining expense, as now practiced, is that of constantly relieving swelling or running ground and retimbering. When the ore shoot is attacked in sections by crosscuts from the lateral drift, any particular section need remain open only a few months at most, instead of two, three or more years, as now. Another advantage may be derived by driving an intermediate level midway between the main levels, if the ground is particularly bad, and connecting with the crosscut beneath by a raise. In this manner the floor of the main level need only be maintained about half the time that would be necessary if all ore were sent down to the main level through mill hole extending upward 100 feet, more or less, and connecting two main leveis. This plan would of necessity require that a raise be cut through solid rock from the vicinity of the main gangway to the foot wall of the vein. Each of these raises would have an approximate height of 45 to 50 feet and would cost, perhaps, when timbered, $500; but the expense of keeping open the level in the vein would soon offset this expense if the ground were very bad. As a matter of course, the superintendent must determine when an intermediate level and auxiliary raise are justifiable. His experience with the ground in the fissure will indicate whether the plan suggested is advisable or not.

When putting through raises it is really an economical plan to sink a winze from the level above to meet the raise. By this means ventilation will be more quickly obtained and the additional work which men can accomplish will soon pay for the added cost of sinking the winze.

(TO BE CONTINUED.)

The Miner's Inch and Its Equivalent in Other Units.

Written for the MINING AND SCIENTIFIC PRESS.

One miner's inch corresponds to 1.5 cubic feet of water per minute. This is the legal allowance in Montana, and is fair average of the measurements actually used in California and other States where no exact value has been prescribed, and where the amounts sold by different water companies vary somewhat.

ONE MINER'S INCH IS EQUIVALENT TO—

	U. S. Gallons.	Imperial Gallons.	Cubic Feet Water.	Lbs. Water.	Tons Water.	Kilograms.
Per second.	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{10}$	1.56	0.0008	0.71
Per minute.	11.2	9.3	1.5	93.5	0.047	42.5
Per hour...	675	562	90	5620	2.8	2550
Per day of 24 hours..	16,200	13,488	2,160	134,880	67.5	61,180

HORSE POWER DEVELOPED FOR EACH 100 FEET OF FALL.

WATER UNIT.	Theoretical H. P. at 100% Efficiency.	Available H. P. at 90% Efficiency.	Available H. P. at 80% Efficiency.
By 1 miner's inch.....	0.3	0.26	0.24
By 1 cubic foot per min.....	0.19	0.17	0.15
By 1 pound per min.....	0.00303	0.0027	1.0024
By 1 U. S. ton per min.....	6.07	5.5	4.85
By 1 U. S. gallon per min....	0.025	0.021	0.02
By 1 Imperial gallon per min.	0.303	0.027	0.024
By 1 kilogram per min.....	0.0067	0.006	0.0053

To obtain 1 H. P. at 100 feet pressure requires 3.5 to 4 miner's inches; or, per minute, 6 cubic feet, 350 to 400 pounds, 40 to 50 U. S. gallons, or 30 to 40 Imperial gallons of water.

CONVERSION TABLE FOR WATER.

U. S. Gallons.		Imperial Gallons.		Cubic Feet.		Pounds.		Tons.		Kilograms.
1.	=	0.833	=	0.133	=	8.33	=	.....	=	3.77
1.2	=	1.	=	0.16	=	10.	=	.005	=	4.54
7.5	=	6.25	=	1.	=	62.5	=	$\frac{1}{32}$	=	28.4
0.12	=	0.1	=	0.016	=	1.	=	.0005	=	0.454
240.	=	200.	=	32.	=	2000.	=	1.	=	907.
0.264	=	0.22	=	0.035	=	2.2046	=	.0011	=	1.

In the above table the U. S. gallon is taken as 8.333 pounds water, which is very approximately correct; on this basis 5 Imperial gallons = 6 U. S. gallons.

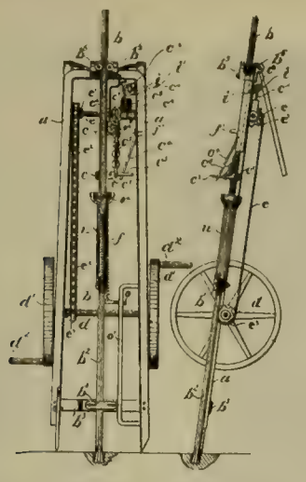
One U. S. gallon per minute = 6 tons water per day. One U. S. gallon per hour = $\frac{1}{16}$ ton per day.

Mining and Metallurgical Patents.

Patents Issued May 15, 1900.

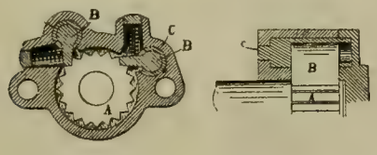
Specially Reported for the MINING AND SCIENTIFIC PRESS.

ROCK DRILL.—No. 649,464; E. Lawson, Brewer, Me.



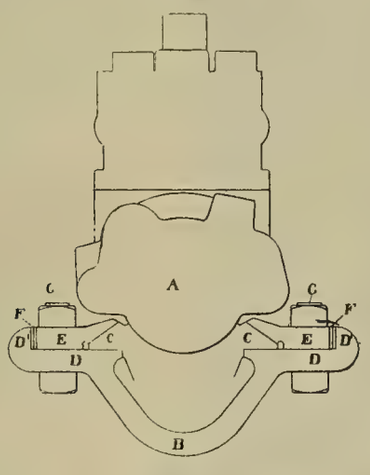
In a rock drill, frame, drill bar carrying drill and adapted to operate in frame, clutch adapted to operate drill bar, means for operating clutch consisting of shaft mounted in frame, drum adapted to revolve on or with shaft and having projection, arm or block secured to shaft and carrying pin adapted to work therein, adapted to engage projection on drum to revolve drum with shaft, and to be disengaged from projection to allow drum to revolve independently of shaft, and means for operating drum.

ROTARY ATTACHMENT FOR ROCK DRILL PISTONS.—No. 649,547; H. P. Reardon, San Francisco, Cal.



A removable slotted sleeve, located in ratchet chamber of drill, having ratchet pawl movably fitted therein sleeve extending beyond width of pawl and having its projecting ends socketed in walls of ratchet chamber and provided with means adapted to prevent axial movement thereof.

ADJUSTING DEVICE FOR ROCK SLIDES.—No. 649,548; P. H. Reardon, San Francisco, Cal.

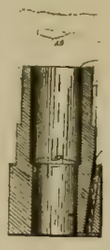


In a fluid actuated rock drill a cylinder, a frame to which cylinder is slidably attached and longitudinal slide and guide between cylinder and frame, provided with detachable gib with bolts or other suitable means for locking gib in place independent of cylinder and fixed longitudinal rib adapted to effect alignment of gib, and means adapted to follow up and maintain parallelism of gib comprising one or more independent parallel strips between gib and rib.

PROCESS OF MAKING LEAD CARBONATE.—No. 649,507; G. D. Coleman, Bridgewater, Mass.

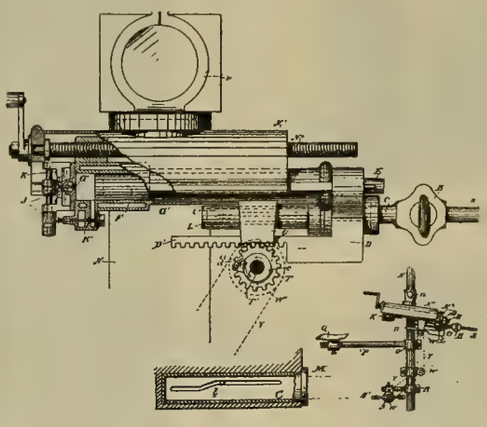
Making pure lead carbonate consists in subjecting metallic lead in the presence of water to the oxidizing action of atmospheric air at a temperature of approximately 125° Fahrenheit, in subjecting product of last named step to action of carbonic acid at lower temperature, in subjecting product of last named step to oxidizing action of atmospheric air at a temperature of approximately 125° Fahrenheit, and in subjecting product of last named step to action of carbonic acid at a lower temperature, whereby all the metallic lead is converted into lead carbonate.

DRILL BIT.—No. 649,488; F. Schrader, St. Louis, Mo.



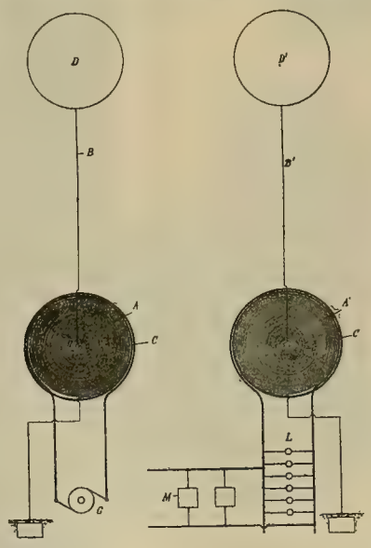
A drill bit comprising hollow cylindrical head, series of conduits formed therein and leading to center of surface of head, series of guide grooves formed in base of head and converging at delivery end of each conduit, shoulder formed in basal surface of head opposite guide grooves and adjacent discharge end of each conduit, upper end of each conduit having recess leading thereto for better guiding shot into conduit.

ROCK DRILL.—No. 649,602; E. M. Greene and W. Brady, San Francisco, Cal.



Combination in a rock drill of pair of cylinders with pistons reciprocating therein, connections between pistons and drill whereby they move in unison, inlet and exhaust valves and actuating mechanism by which cylinders are alternately charged and exhausted, and pistons impelled in same direction at each impulse, an independent motor, connections between motor and shaft having pinion loosely turnable therein, rack bar connected and movable with pistons and drill and engaging pinion, pawl and ratchet by which pinion is connected with shaft to return pistons after stroke, and pin by which pawl is disengaged to allow pinion to turn freely while pistons and rack are being advanced.

APPARATUS FOR TRANSMISSION OF ELECTRICAL ENERGY.—No. 649,621; N. Tesla, New York, N. Y.

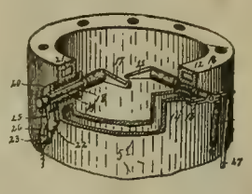


Combination with transmitting instrument comprising electrical transformer having its secondary connected to ground and to an elevated terminal respectively, and means for impressing electrica oscillations upon its primary, of receiving instrument comprising transformer having its primary similarly connected to ground and to an elevated terminal, and a translating device connected with its secondary, capacity and inductance of secondary of transmitting and primary of receiving intruments having such values as to secure synchronism with impessed oscillations.

EXTRACTION OF GOLD OR OTHER PRECIOUS METALS FROM SLIMES.—No. 649,628; W. A. Caldecott, Johannesburg, South African Republic.

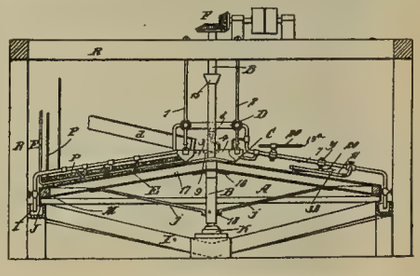
A method of extracting precious metals from finely divided materials, such as slimes, containing reducing substances such as ferrous sulphide or hydrate, which consists in rendering the material alkaline, then forcing air into the pulp until the ferrous compounds are converted into ferric hydrate, then adding cyanide and continuing aeration and agitation until the precious metals are dissolved.

ELECTRICAL IGNITER FOR GAS ENGINES.—No. 649,778; D. M. Tuttle, Canastota, N. Y.



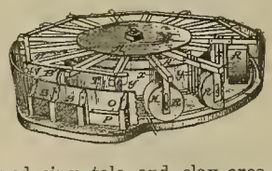
In a gas engine in combination with cylinder, a shaft 18, journaled in metallic bushing 19, insulated an insulating bushing 21, an integral terminal 17 on shaft, arranged at right angles thereto and within cylinder, an insulated arm 22, secured on outer end of metallic bushing by an insulated nut 20, carrying binding post 23, for attachment of line wires, rod 26 secured to out end of shaft to engage with binding post and limit return movement of terminal, spring 25 coiled on outer end of shaft between rod and nut having its lower end engaging with binding post; an uninsulated shaft 12, journaled in cylinder having terminal 11, extending at right angles therefrom adjacent to terminal 17, arm 13, secured to outer end of shaft 12, spring 15, secured to one end of arm, stop 14 engaging with other end of arm to limit movement of terminal 11, spiral spring 16 arranged on shaft 12, between arm 13 and outer surface of cylinder; a pitman 27 operated by eccentric 34 on shaft 1 of engine to engage with spring end of arm 13, to force terminals into contact and for a certain distance against action of return springs.

AMALGAMATOR.—No. 649,796; A. Z. Baldenebro, Mexico, Mexico.



Combination of rotary amalgamated table, stationary water pipe above it, clamp embracing pipe, shaft journaled in bearings rigidly connected with one clamp member, wedge projection located upon shaft and adapted to engage other clamp member, guide having universal joint connecting it with clamp, rod slidable in guide, branch pipe communicating with water pipe but movable relatively thereto, and supporting connection between rod and branch pipe.

PULVERIZING AND SEPARATING MACHINE.—No. 649,817; C. W. Day, Santa Cruz, Cal.



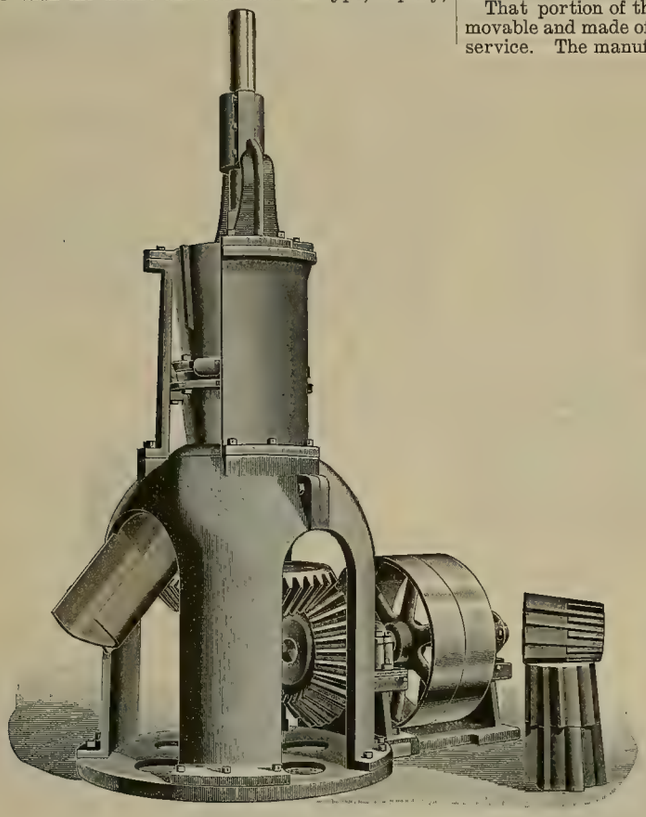
Mill for reducing talc and clay ores, comprising vertical post, or shaft, series of radiating arms, hangers pendent therefrom provided with vertical slots, rollers journaled in slots, arranged at different distances from post, series of scrapers and stirrers attached to and pendent from arms arranged in radial line with rollers, exteriorly or interiorly thereof, and scrapers and stirrers alternating on respective arms, and circular trough, having flat bottom with side grooves.

The Gouverneur Rotary Rock Crusher.

This crusher is intended to follow jaw crushers of the Blake type, reducing material much finer than the Blake and others of the type, rapidly, and without overstrain crushing down to, say, 2 inches in diameter.

The Gouverneur rotary taking material 2 inches in diameter will reduce to ⅜ inch and finer at a speed of from three to five tons per hour.

That portion of the machine subject to wear is removable and made of material calculated to give good service. The manufacturer makes no claim for novelty in principle, but offers, as a result of experience, a machine that after many trials is considered by him as one of the best of its kind, being self-contained and with strength where strength is required. In one form or another this machine has been for many years used in the crushing of talc rock which, on account of its fibrous nature, is considered hard to reduce.



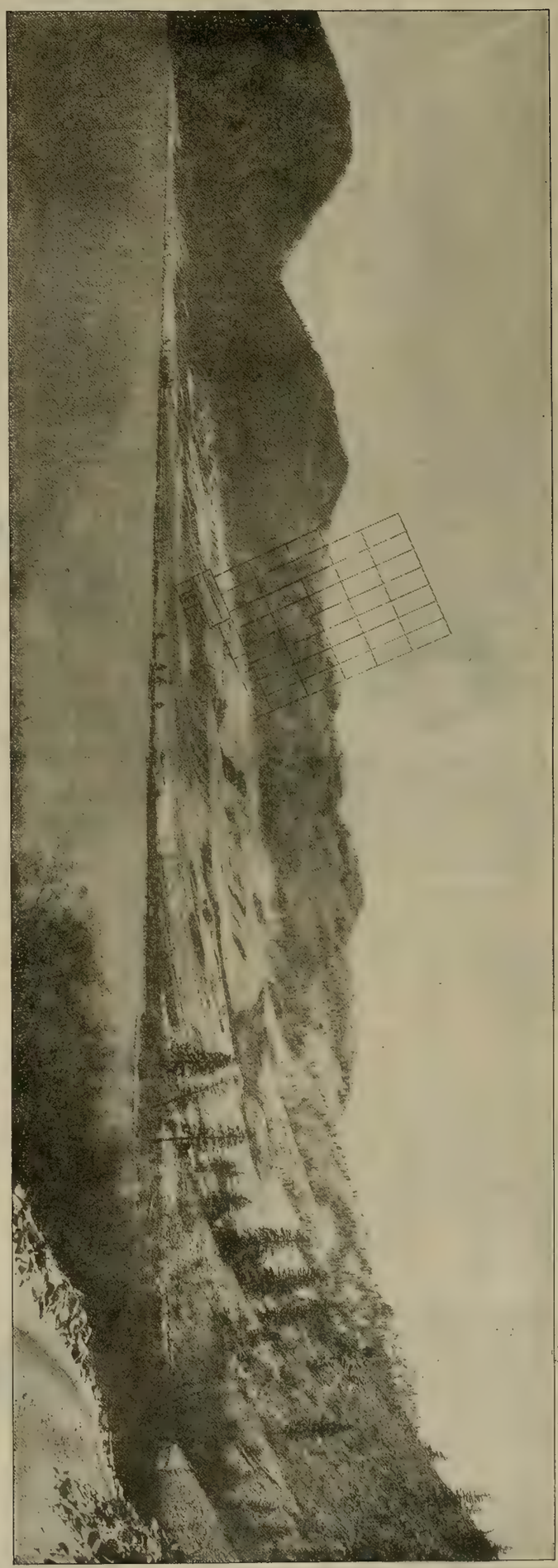
The Gouverneur Rotary Rock Crusher.



Old Shaft of the Phantom Claim, Bull Dog Mine, Okanogan County, Wash. (See page 585.)



Palmer Mountain District, Okanogan County, Wash. (See page 585.)



Western Slope of Palmer Mountain From the Wagon Road at the End of Palmer Lake, Okanogan County, Wash., Showing the Bull Frog Group of Mining Claims. (See page 585.)

Treatment of Copper Mattes in the Bessemer Converter.*

NUMBER III.

The pressure required in the upright converter is from 12 to 15 pounds, but in the trough or barrel converter from 3 to 10 pounds pressure suffices. We have made experiments lately with a direct pressure blower. The two vanes in this type of blower, of figure of eight shape, revolve in a shell. When applied to create high pressure, the vanes and shell must be thoroughly watercooled by water jacketing or by lubrication by water. The heat generated by high pressure otherwise melts the dope with which the vanes are coated. It was found quite possible with water lubrication to carry the pressure up to 12 pounds, and the horse-power consumed did not seem to be in excess of that of the blowing engine, but the water as a lubricant proved to be objectionable. Though all free moisture appeared to be condensed and the hot air when under pressure was apparently dry, as soon as the pressure was removed sensible moisture was liberated. This moisture did not effect the operation during the first half of the blow, when no metallic copper was found, but it seriously retarted the second. Long noses of chilled copper was formed, which protruded from the lining into the body of the converter, and reminded intact after the charge was poured. By thus reducing the effective size of the converter, these noses may have been the principal cause of the retardation. The experiment, though not conclusively satisfactory, encourages one to believe that this cheap, and cheaply installed, form of blower may supplant the costly blowing engine where the trough or barrel converter, which demands but a low blast, is used.

STEPS OF THE OPERATION.

Passing from the structural features of the plant to the steps of the operation by which matte is blown up into copper, and the metallurgical changes which result, they may be considered in the following order: 1. Lining the converter; 2. Charging the converter; 3. First blow; 4. Skimming; 5. Second blow with frequent punching; 6. Final skimming; 7. Pouring the metal; 8. Repairing the lining; 9. Disposal of slag.

As no practical method has been devised for adding silica to the charge, except through the medium of the lining, the constitution of the lining and the mode of building it into the shell, are matters of extreme importance. Attempts have been made to blow the silica into the charge through the tuyeres, and to satisfy the matte by throwing it as lumps into the converter mouth; but apart from mechanical difficulties attending these methods, the silica remains too short a time in conflict with the matte to permit of its combination with the oxidized iron, and therefore whether added in powder or in coarse particles, most of it is found floating unaltered in the slag. The violent agitation of the converter's contents, and the rapidity with which the reactions take place, and the large body of slag which is almost immediately formed and protects the matte, may explain the anomaly.

Though it is difficult to see why finely divided silica ascending through the charge should not be attacked in preference to silica embedded in the lining, nevertheless reports of experiments prove that the silica whose specific gravity is so much less than that of the matte, does in great measure escape unaltered, and that the lining is the only economical menstruum for its supply. The practice has generally been to make the lining as siliceous as possible, using a pure quartz or quartzite mixed with only clay sufficient to make a plastic mass capable of being hard-moulded into lumps, which are generally pounded, also by hand, into the converter. When the lining is not mechanically pressed into the converters, and the grade of the matte not above 50%, about one-half, often somewhat more, of the weight of lining is consumed to the weight of copper pigs made. At the Great Falls the lining is mechanically pounded into place by a steel tamper around a steel templet, which is expanded by a wedge while the lining is being inserted, and can be made to collapse sufficiently for extraction by the removal of the wedge after the lining is thoroughly set. The converter during the tamping rests on a revolving table. In this way the mass is more uniformly compacted, leakage of blast between the lining and the shell, or through the porous lining, is minimized, a larger amount of material is compressed into a given space, and the surface is smoother and less liable to abrasion than in the hand-made lining. As a result a single lining slags more than twice as many charges than when it is hand-laid, which is partly due, however, to its greater thickness. Usually with a 45% to 50% matte not more than four charges can be tapped to a lining, and between each charge more or less patching is done through the mouth of the converter. The patching can be more easily effected in the shallow trough or barrel converter than in the deep vertical shell. It has been found, however, that a much more basic lining can be used without retarding the final reduction to metal, and that the presence of copper is not detrimental.

The slags from siliceous lining run generally about 50% in FeO. As the lining eats away, the size of the charge increases. For instance, in a run of five charges to a lining of very aluminous gold ore in a trough converter, the production was:

1st	charge	11 bars.
2nd	"	12 "
3d	"	14 "
4th	"	15 "
5th	"	21 "

74 bars of about 250 lbs. each.

Another lining the same day lasted only for four charges, and gave:

1st	charge	8 bars.
2nd	"	12 "
3d	"	16 "
4th	"	21 "

57 bars of about 250 pounds.

In this experiment, on twenty-three tons of ore as lining, there were made fifty-five tons of copper. The matte was high. But if the lining be siliceous, and the mattes of from 45% to 50% Cu, the quantity of lining consumed is approximately one-half the copper produced. Hixon says with regard to the practice at Aguas Calientes, in the very large converter, already referred to:

"At Aguas Calientes the lining was made entirely of ore, and this contributed a great deal to the success of converting low-grade matte at that point. If quartz had been used instead of ore, the expense would have been too great to admit of 30% Cu matte being converted. It was very fortunate that an ore of such ideal composition for the purpose was to be had. This ore came from Pachuca, State of Hidalgo, and was mined there in large quantities."

As the lining becomes thin, the danger of cutting through the converter shell at some weak point becomes imminent. To avoid this we lay a single course of magnesia brick on the iron shell, then pound siliceous lining over it. The magnesia does not melt even when exposed at spots, where the silica lining happens to be quite corroded and in contact with it. The magnesia brick are, of course, drilled for the tuyeres, but through the soft clay linings the tuyeres are made by merely punching a hole the required size, generally ¾-inch. An iron tuyere penetrating the lining has been generally abandoned as needless.

(TO BE CONTINUED.)

*Condensed from a paper read by JAMES DOUGLAS before the London Institution Mining and Metallurgy.

Carr Commutator Truing Device.

The Akron, O., Electrical Mfg. Co. is producing a device for turning up the commutator of a generator without removing the armature from its bearing, built on the engine lathe principle and directly attachable to any machine having a removable bearing cap.

The T-shaped clamp (1) is bolted to the machine in place of the bearing cap; set screws (8) being provided in its lower end to rest against its pedestal and steady the tool. On this piece is clamped the tool bar (6), by means of a saddle, that allows the bar movement both perpendicular and parallel to the face of the commutator and which instantly clamps the two pieces by drawing the lever nut (4). The bar (6) carries the slide (10), which in turn carries the tool post (2); this slide is driven relative to the bar by means of screw and hand wheel so giving the feed. The adjustment of the tool at right angles to the face of the commutator is also accomplished by a hand wheel and screw operation on the saddle (7), it being first necessary to slacken the lever nut slightly. At the extreme outer end of the tool bar a threaded rod (3) is screwed in, and intended to be screwed down to a solid support, acting as a jack to steady the tool at the extreme limit of its cut. A center (5) is attached to the device by means of adjustable brackets, to prevent end motion in the commutator while being turned.

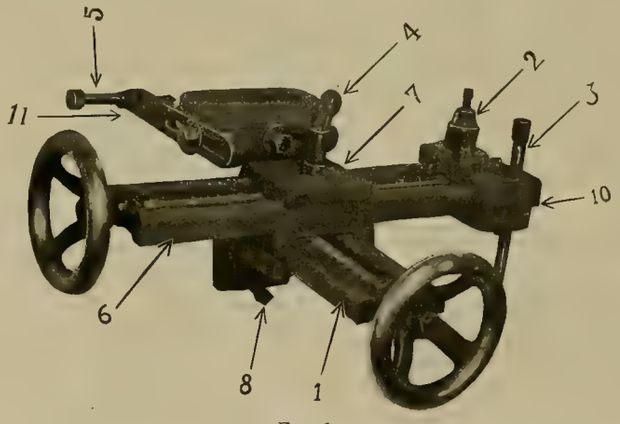


FIG. 1.

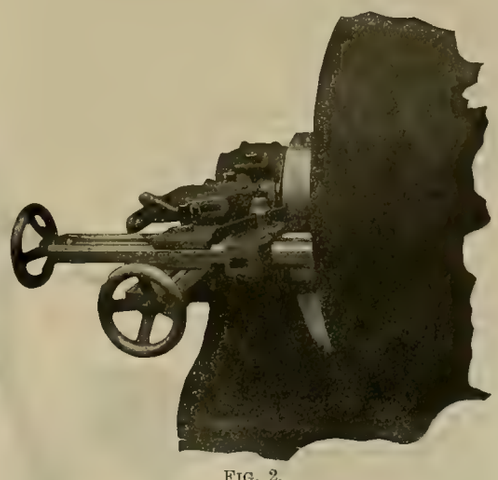


FIG. 2.

The general method of attaching the device to a generator is shown in Fig. 2.

For the best work a commutator speed of from 200 to 250 feet per minute is desirable, and in the case of large machines this can generally be obtained by slowing the source of power. A crank for attachment to the pulley is provided so the machine can be operated by hand if necessary, but it is desirable to use the power drive owing to its more uniform speed.

Some Current Comment From Our Readers.

NO LONGER A CURIOSITY.

We had until recently what we here considered a curiosity—a mining superintendent who didn't take nor read the MINING AND SCIENTIFIC PRESS; but of late he has taken to looking over its pages, and herewith I send you his name and $3 for one years' subscription.

Kingman, Ariz., May 3.

GETS A BIG THREE DOLLARS' WORTH.

I am amazed at the amount of valuable technical matter you weekly furnish. For $3 I get fifty-two treatises that would cost me in other form at least $100. I think you ought to get 50,000 subscribers.

Sonora, Mexico, May 5.

THE BEST OF ITS KIND.

Enclosed find $3 to continue my subscription for the MINING AND SCIENTIFIC PRESS. It's the best paper of its kind printed anywhere.

Saint Joe, Ark., May 1.

HAS A SUPERIOR INDIVIDUALITY.

Saw a copy of your issue of Jan. 7. I appreciate the practical articles on mining methods. Send the paper to following address for 1900 and also to our London office, addressed as enclosed. Your paper has a superior individuality to that of any other similar publication. Enclosed find draft for £1 13s. for both papers for 1900.

Adelaide, So. Australia, March 5.

PLEASED WITH THE PRACTICAL ARTICLES.

I am especially pleased with the great number of valuable practical original articles you publish. You weekly have more original matter than all your competitors combined that I ever see.

Seattle, Wash., May 6.

Age of the World.

Heinrich Schmidt, a German geologist of Jena, has figured out the various periods of millions of years, which convey no meaning to most minds, into parts corresponding to parts of a day. This gives him these results: The first age of the world, the Archaic or Eozoic, occupied the same period toward the whole age of the world as do 12 hours, 28 minutes and 48 seconds toward a day. The Paleozoic age was the equivalent of 8 hours, 9 minutes and 30 seconds. The Mesozoic age equaled 2 hours, 38 minutes and 36 seconds. The Quaternary equaled 2 to 3 minutes, and, finally, what we are accustomed to call the history of the world—the history of the last 6000 years—amounts to only 5 seconds.

Aging Timber by Electricity.

THE aging of timber, which formerly required long storage, is now completed by electricity in a few hours. In the Nodon-Bretonneau process the timber is piled on a lead frame in a large wooden vat, is nearly immersed in a chemical preparation, and is covered over by shallow vessels of water having porous bottoms of felt and linen. The positive pole of a dynamo is connected to the lead frame and the negative pole to the water vessels. On the passage of the current, the sap is driven to one side of the wood and expelled, and the chemical liquid enters the pores and takes its place. After drying, the wood is ready for use.—Electricity.

The Cyanide Process at Mercur, Utah.

In the issues of April 21, 28, and May 5 appeared a valuable technical article entitled "Some Observations on Practice of the Cyanide Process at Mercur, Utah," written for this paper by Wm. Magenau. Supplementary thereto is appended a detailed account of the process at the Golden Gate mill, Mercur, Utah, written by D. C. Jackling, another expert in cyaniding.

The Mercur ores in general cannot be characterized specifically with regard to their physical or chemical composition for the reason that they are made up of widely varying proportions of several distinct varieties of gold bearing material, viz., a very fine grained, minutely fractured and extremely tough hard quartz; a siliceous limestone, also highly fractured; a compact ferruginous clay, and small quantities of decomposed porphyry. These varieties of rock occur singly and mixed in all proportions. The values in the quartz and limestone lie largely in the numerous fracture seams; in the clays and porphyrys they are very uniformly disseminated throughout the mass, and this class of ore is usually of higher grade than the others. Locally, the ores are classified into three varieties, according to their mode of treatment:

First—"Oxydized ores," consisting of a mixture in which the calcareous and siliceous varieties predominate, and in which the proportion of clay and talc is insufficient to interfere with percolation. This class of ore contains only an insignificant quantity of compounds of base elements, showing only very small fractional percentages of mercury, as cinnabar and arsenic oxidized compounds.

Second—"Talcy ores," which are almost entirely clay and soft, decomposed porphyry. These ores, like the class above, are almost free from base element compounds, but impossible of percolation, for the reason that on contact with water they disintegrate and settle to an almost impervious mass.

Third—"Base ores," consisting of a mixture of the above classes, with the calcareous and talcose varieties predominating and containing large quantities of base metal sulphides. Arsenic is the chief of these, occurring as realgar, orpiment and mispickel, in quantities sometimes as high as 50%, but averaging not to exceed 2%. Realgar is by far the most plentiful of the arsenic-bearing minerals, fully three-quarters of the arsenic occurring in this way. Antimony is present as stibnite. Occasionally small quantities of galena occur. Considerable quantities of iron pyrites are frequently encountered in minute crystals. Mercury is invariably present, but in less quantities than in the oxidized ores. Various hydrous sulphates of iron are present, as well as oxidization products of arsenic, both simple and in combination with lime and magnesia. Some of the rarer elements, most notably tellurium, are also present—in traces only. The clays of this class of ore are invariably dark gray or black in color, due to a considerable quantity of carbon, frequently as much as 4%, and in these are sometimes found organic compounds, which decompose potassium cyanide very rapidly. Silver is very sparingly distributed in all classes of ore, rarely exceeding one ounce of silver to ten ounces of gold. No metallic gold is visible in any of the ores until after they have been roasted, when occasional minute irregular particles may be discovered under the microscope. All the clean, base minerals are invariably poorer in gold than the gangue with which they are associated. The clear crystals or realgar and orpiment carry none at all, or only traces, showing that the incased values of the base ore are not directly due to these base metal minerals. The gold in whatever ore found dissolves very rapidly and completely in solutions of potassium cyanide, indicating that it is very finely divided in whatever condition it occurs, and these various facts have led me to the conclusion that the gold in these ores is present in a finely divided amorphous, metallic state, having the black or brown color characteristic of the metal when in this condition and consequently being unrecognizable under the microscope in its naturally occurring state.

* * * *

The ores are roughly graded in the mine into the three classes above described, viz.: "Oxidized," "talcy," or, as it is called in at the works, "mixed," and "base," and these classes are kept separate until the furnaces are passed, when they are all mixed together to go to the leaching tanks.

In order to keep the three classes of ore separate, the crushing machinery is necessarily arranged in three series, and both the large storage bins divided into three compartments. The crushers are so arranged that two classes of ore can be taken through either of them, but the rolls are operated each series for one class only. The crushers are set so that everything passing through them will pass a 2-inch ring. From the coarsely crushed ore storage bin the ore is automatically fed to the driers, and by them discharged to the heads of Berthelet screens, the fines going direct to the elevators, which discharge them into their proper finished ore bin compartment. The coarse ore passes a set of large rolls, set with their faces about half an inch apart, to another inclined screen, where the fines are kept face to face. From the small rolls the ore passes to elevators and is elevated to revolving screens, the fines drop directly into the bin and the rejections are returned to the small rolls for further reduction. It is seldom necessary to operate the driers, as the ore as it comes from the mines, except at unusually wet seasons, can be rolled and screened to the proper fineness without previous drying. On this account belt conveyors have been provided above the driers to convey ore from the coarse ore bins to the rolls when it is not necessary to dry it. These also work entirely automatically. On account of using both inclined and revolving types of screens, it is not possible to get an absolutely uniform product, but it is intended to finish the oxidized ores so that they will pass a 3-mesh No. 16 wire cloth; the talcose or mixed to pass a 4-mesh No. 15 wire, and the base an 8-mesh No. 16 wire. About 90% of the pulp will pass those sizes, the remaining 10% or slightly coarser material having gone through the inclined screens, the mesh of which is necessarily coarser than the product desired, on account of the inclined position of the cloth.

From the finished ore bin, the oxidized ore is ready to go direct to the leaching tanks, the base and mixed classes going to the roasting and calcining furnaces. The four furnaces nearest the bins are automatically fed from it by means of an elevator discharging into a small hopper connected by a 6-inch standard pipe to each of the furnace automatic feeding hoppers. It is worthy of mention that all spouts in the mill are 6-inch or 8-inch standard black pipe, and that they serve the purpose admirably from the fact that they are dustless, seldom clog, and when worn on one side can be turned one-third way over, thus affording three new wearing surfaces for one spout, and avoiding the troublesome operation of frequent repairing. The other five furnaces are automatically fed by two belt conveyors, one conveyor supplying two furnaces, and the other, which is over 200 feet long, supplying the other three.

The base ores are roasted to a "dead" or "sweet" condition, or as nearly so as practicable, being finished at a bright red heat. The raw ores enter the furnace with about 2% to 5% sulphur and 1% to 2½% arsenic, have these constitutents reduced to about three-fourths of 1% and one-tenth of 1% respectively. The high sulphur contents remaining in the roasted ore is almost entirely due to calcium sulphate, the sulphur remaining as sulphides rarely exceeding one-tenth of 1%, and usually being lower. The arsenic sulphides, realgar and orpiment, begin to volatilize with only partial decomposition, causing dense orange colored vapors to arize, before the ore reaches the first fireboxes in its travel through the furnace, and by the time it reaches a dull red heat 90% of these minerals have been discharged; but the most difficult part of the roasting operation follows in completely oxidizing the pyrites and arseno-pyrites. This difficulty is partially due to the fact that a high heat is not permissible on account of the presence of from 5% to 10% of lime in the ore, producing a mixture which sinters easily and is consequently ruined. It is worthy of note that in most careful investigation and checking of results on the roasting of over 100,000 tons of this arsenical ore, no appreciable gold losses could be detected that were traceable to other causes than ordinary dust losses, which were only a small fraction of a per cent.

The talcose ores are calcined, not so much for the purpose of ridding them of any deleterious compounds, as to change their physical characteristics, although the small amount of arsenic present in them as arsenous acid and its compounds is slightly reduced. The sulphur contents, all of which are present as sulphates of the alkaline earths, is not affected. The primary reason for the calcination of this ore is to dehydrate the clay and talc, and deprive them of their properties of plasticity, thus rendering them amenable to percolation, and this is very effectively done. The effect on the clayey ore is much the same as that of burning a brick clay, and the particles of ore which when raw would immediately disintegrate on contact with water, are after calcination unaffected by it. The ore is at the same time rendered extremely porous and permeable by solution, and is thus transformed from an impossible leaching ore to an ideal one. Both styles of furnace in use have been used as roasters and as calciners.

(TO BE CONTINUED).

Filing an Adverse Claim.

TO THE EDITOR:—I noticed week before last in "Concentrates" that in order to file an adverse claim in the U. S. Land Office a survey must be made by a U. S. Deputy Surveyor and a map filed showing the conflict.

On the 19th of January, 1900, the Ursa Major Supply Co., filed its application for a patent to the Big Hill Consolidated placer mine, containing 300 acres by legal subdivisions, and the sixty days publication was up March 23. On the 17th of March, Jas. Hill filed an adverse claim in the Land Office at Sacramento, which was accepted, stating that he claimed 1320 feet square, but not by legal subdivisions, of the ground applied for. He did not have it surveyed, nor did he file any kind of map, showing what part of the ground he claimed, but yet the Register and Receiver accepted it and ordered it tried in the Superior Court of Placer county, and the case comes up for trial on the 23d of this month.

I am superintendent of the Big Hill Con. mine and am acting as attorney in fact for the Ursa Major Supply Co., and it seems to me that this case would interest miners all over the country who contemplate ever getting a patent, and I hope you will inform us through "Concentrates" under what law the officials at Sacramento were acting when they accepted it and compelled the U. S. M. Co. to go to the expense of a suit over the property.

Iowa Hill, Cal., May 15. E. M. ARMSTRONG.

The "Concentrate" referred to was an exact statement of general fact. The conditions recited above can not receive exact answer, as this paper is not acquainted with all the facts in the case. It may, however, be said that an adverse placer claim under the circumstances set forth by Mr. Armstrong should be supported by a proper survey. If the local land offices have erred in its reception an appeal should be taken. The local land offices have not the right to order an adverse claim suit to be brought in any particular court. If they do so their action may be treated as a nullity.

New Era Electric Drill.

The New Era Electric Rock Drill Co. of Denver, Colo., are manufacturing an electric rock drill, designed by M. C. Jackson, which is shown in the accompanying illustration. The description given herewith will be of interest to our readers. The electric motor which drives the drill is encased in a small, compact box, dust and moisture proof, and may be operated by currents from an electric power station, a steam or gasoline engine or a water wheel. Motor and drill are connected by a flexible shaft, a small starter at the rear end of the drill being provided, which gives the operator instant control in starting and stopping. The flexible shaft imparts motion to beveled gearing at the end of the driving axle of the drill; and on the opposite side of this axle is a gear which drives the flywheel, the latter being so geared that when the driving axle is run at 600 revolutions per minute the flywheel makes 900, greatly increasing the efficiency of the latter. The driving axle passes through the crosshead of the drill, the rear end of the crosshead containing a peculiarly shaped slot, so contrived that a one-fourth forward movement of the axle crank gives the full forward striking blow. Thus the momentum given the piston, with the drill running at 600 revolutions, is equal to the momentum of a crank running at 1800 revolutions. The rear end of the piston passes through the forward end of the crosshead, making a loose fit. Two buffet springs give the piston recoiling power, one of them being located on the inside of the front end of the crosshead and the other fitting snugly against its outer front end. By means of these springs the piston is prevented from striking a rigid blow. It must not be understood, however, that these springs are a factor in giving power to the stroke, as the power of the blow is derived entirely from momentum. Another feature is the rotation of the drill bit. Two rabbeted cases contain the pawls; one case rotates the piston on its backward movement and the other holds the piston when rotated and imparts to the latter a direct, straight blow, never permitting the bit to strike the rock a glancing blow. The steel is held in chuck by a novel one-nut clamp. The main clamp of the drill is held by one bolt, and by loosening one nut the drill is placed on a perfect swivel. A feature of the clamp is its side motion, by which, when a hole is started, the clamp proper need not be loosened till the hole is finished, as the side movement for changing bits is readily made. The machine is simple in construction, strikes a blow equal to about 200 pounds, delivering from 500 to 700 blows per minute. The power required is a 1 to 2 H. P. motor to each machine.



New Era Electric Drill.

MINING SUMMARY.

ARIZONA.

COCHISE COUNTY.

A recent discovery of ore near Charleston may bring that long dead camp into prominence. The Pittsburg-Arizona G. & C. Co. has developed a group of claims near the one-time prosperous smelting town, the Porto Rico, San Juan, Manila, Resurrection, Giant, Santiago and Havana running rich in gold, silver and lead.

COCONINO COUNTY.

At the Anita mines ninety men are employed under the supervision of Supt. McAdams.

The railroad from Williams to the Grand canyon has been completed a distance of 40 miles and promises to open up a large and rich mineral district.

PINAL COUNTY.

General Manager Blair of the Mammoth mine says his company has just completed an addition of twenty stamps to its 50-stamp mill, and is now completing contracts for the installation of an electric plant that will cost $150,000.

SANTA CRUZ COUNTY.

Oasis: In prosecuting work upon the Mowry mine, in the Patagonia mountains, between Harshaw and Washington Camp, the present owners have in several instances found good ore in the old workings which had been missed by the former owners. In one place they drifted a distance of 50 feet only a foot or two away from a fine body of ore.

YAVAPAI COUNTY.

Manager Treadwell has started work on the property of the Brookshire Copper Co., near Jerome.

Supt. Harrington has started up the old Tiger mill in the Bradshaw mountains. He closes down every Sunday.

Courier: Mendenhall Bros. are milling ore from their mine near Senator.——The Cash mine is working twenty men and has from $60 to $100 ore in the tunnel.

YUMA COUNTY.

In the Los Trigos mountains, near the Colorado river, 12 miles from Ehrenburg, miners are making wages. Nuggets from $1 to $10 in value are of frequent discovery. Most of the gold is very coarse; it is saved by scraping the bedrock, the finer gold being saved by dry washer.

CALIFORNIA.

AMADOR COUNTY.

In the El Tarantula mine, near Stent, operated by the El Tarantula M. Co., Ltd., the ore body is slate, intersected by veins of quartz, going $12 per ton.

Ledger: The mill now building at the Central Eureka mine is expected to be in operation in July. The recent crushing of rock at the Zeila mill from this mine averaged about $90 per ton, as follows:

Crushing.	Tons.	Value.
First	185½	$15,000
Second	357	27,000
Third, low grade	220	1,800
Fourth	507	46,650
Totals	1269½	$90,450

BUTTE COUNTY.

F. W. Raymond is going to build a ditch three miles long for the Golden Hill mine at Powellton.

The Golden Hill M. Co., C. J. Blaisdell, Supt., will open a hydraulic mine on Big Butte creek, two miles west of Powelton. They have dug a ditch four miles long to carry 1000 inches of water and give a fall of 250 feet. The company owns 140 acres of mining land. The company has run a cross tunnel 260 feet, showing paying gravel.

The Iron Rock Channel mine, on Butte creek, near Powelton, is building a dam to divert the waters and work the bed of the creek. A. L. Glassell is owner and superintendent.

The Golden Trout mine is employing twelve men. The shaft, three compartments, each 4½ by 5 feet, is being sunk. A new 10-stamp mill is to be put up.

Spencer & Co., at Franklin Hill, are developing a gravel mine, and working a hydraulic mine.

P. Willott, on Pickett creek, eight miles from Franklin Hill, is opening a gravel mine.

Colorado men have bonded the Walters mine on Fall river, and have twelve men employed.

CALAVERAS COUNTY.

(Special Correspondence).— The old Napoleon mine, recently bought by Ben & Lewis Williams is being unwatered and machinery is now on the ground for sinking deeper under the superintendency of John Andrews.

Milton, May 20.

The Ford M. Co. near San Andreas is arranging with the Standard Electric Co. for power for their 10-stamp mill.

The San Pedro mine, Glencoe, is bonded to T. G. Hart for $11,000, the first payment of $1,000 is made. A new hoist is to be erected.

The Angels Echo hears that W. Miller, formerly of the Utica, is to take charge of the Morgan mine, and that work will be on an extensive scale.

HUMBOLDT COUNTY.

(Special Correspondence).—The Orleans Bar G. M. Co. have just completed their flume and ditch. The total length of the canal is 63,066 feet—38,877 flume, 24,189 ditch. The main flume is 5 feet wide, 3 feet deep; the main ditch is 5 feet 6 inches wide on the bottom, 8 feet 3 inches wide on top and 2 feet 9 inches deep. The grade is approximately 10 feet to the mile. The company owns 1300 acres of patented land at Orleans Bar, and the ditch is brought on to the property 700 feet higher than the Klamath river. They purpose using a No. 5 and a No. 4 giant under 350-foot pressure. The main string of pipe is 22-inch, tapering down to 15-inch. The water utilized is brought from Camp creek; the dam is 28 feet high, and the water is diverted through a tunnel some 520 feet long, whence it empties into the main flume. The company have been operating two sawmills and have consumed some 1,700,000 feet of lumber on the flumes. The company's head office is in New York City.

Orleans Bar, May 18.

KERN COUNTY.

The Kinyon mine at Randsburg has leased an 8-stamp mill at Garlock, to which they will haul ore.

MARIPOSA COUNTY.

The chimney of ore found in the Pocahontas mine is reported to yield copper running 50%.

The vein has been struck in the Mariposa mine at 500 feet.

Supt. Bisland of the Nameless M. Co. at Mariposa tells the Mariposan that during the summer he will put up a mill and a dam to furnish water for a turbine wheel to run the mill, air compressor and hoist.

NEVADA COUNTY.

The Texas M. Co. has levied an assessment of 10 cents per share, delinquent July 11.

The Sunflower G. M. Co. will develop and work a mine in Nevada county. H. H. Look, G. H. Clark, R. J. Carpenter, A. P. Booth, A. J. Thomas and R. Jadarola are directors; capital stock, $50,000, 2600 subscribed.

Supt. Davies, at the Texas mine, will sink the main shaft 300 feet deeper.

Supt. Morrell has started the new mill at the Hudson mine, Rough & Ready district. The ore carries so much sulphurets that he has ordered two more concentrators.

The Union hears that the Culbertson mine at Graniteville will resume operations soon.

Operations have been resumed at the Lindsay mine, near Maybert, by W. R. Chadbourne.

PLACER COUNTY.

President Grose of the Pioneer G. M. Co. says in reply to the attack made on the present management by an ex-director: "He first accuses the present management with eating up $100,000 of the stockholders' money, and follows this by a review of operations at the mine, which show that the funds of the company were put to good use. He neglects, however, to mention that $50,000 of the '$100,000 eaten up' was returned to the stockholders in dividends. Mr. Cox mentions that $15,000 was paid for a piece of property to the north of the mine. This, in my opinion, was a good investment. He says that the Pioneer is one of the best equipped mines in California. It is, and the equipment was paid for out of the '$100,000 eaten up.' The American river was dammed and the best water power and electrical plant in California provided for the mine, and the development work 'carried to the verge of the ore shoot,' as he acknowledges, by the present management. All of this has been paid out of the $100,000 that Mr. Cox claims was 'eaten up' by the present management. In fact, everything is in preparation for the opening of the ore body. The assessment will fall most heavily on those who own the stock, and very lightly on Mr. Cox."

PLUMAS COUNTY.

At Johnsville, B. H. Bancroft of San Francisco has bonded the Gold Lake mine.

SHASTA COUNTY.

Workmen are building sixty roasting stalls at the Bully Hill mine.

SIERRA COUNTY.

Supt. Mather, of the Plumbago mine at Moore's Flat, Nevada county, has bought the Oriental mine at Alleghany and projects a tunnel 1300 feet to drain the mine.

SISKIYOU COUNTY.

The Sheba M. Co. has levied a second assessment of 10 cents per share with intent to put more machinery and more work in the mine at Patterson creek.

At the King Solomon mine twenty men daily extract and crush seventy-five tons ore. The company will put a pumping plant at the mouth of Mathews creek to keep the mill running throughout the entire year. This year the mill closes down July 1.

The Union says river miners are getting ready to wingdam along the Klamath river, which is now low and will be low all summer, as there is very little snow in the mountains. Besides being a good season for river mining on account of low water, the Klamath can also be worked by dredger.

TUOLUMNE COUNTY.

At the Rhode Island mine, the main shaft is down over 300 feet. The rock assays $25 per ton.

The Big Betsy mine has consolidated with the Slapjack; the latter will be developed, using the machinery bought for the Big Betsy.

Supts. Carlin of the Rhode Island, Callahan of the Mississippi and Phillips of the Phillips mine propose a dam across the Tuolumne river at the latter mine to furnish power for the mines of Big Oak and Groveland.

At the Longfellow mine, Big Oak Flat, Supt. Coyle's announcement that wages would be cut from $3 to $2.75 a day caused an immediate strike of the entire force except one man.

The Cherokee Gravel & G. M. Co., near Carters, have 290 acres of good gravel ground and will drive their drifts 2100 feet farther to the river bed. A 4-mile ditch from Turnback creek will bring 250 miner's inches with a fall of 250 feet and three giants will turn loose as soon as preliminary work is completed. W. K. Fletcher, Soulsbyville, is secretary.

The strike in the Mazeppa mine, near Stent, is reported as valuable. The vein was tapped on the 300-foot level.

YUBA COUNTY.

The River and Harbor bill contains a resolution directing the California Debris Commission to proceed to construct debris dams with money on hand and to purchase land necessary therefor, and the work of constructing the dam at De Guerre Point on the Yuba river, near Smartsville, may soon begin. California and the U. S. jointly appropriated $500,000 for that work in '96, and since then careful experiments have gone on. Congressional action now makes the amount immediately available.

COLORADO.

BOULDER COUNTY.

(Special Correspondence).—The B. & M. mine is in good grade of iron and copper sulphide, carrying gold and silver, at 800-foot level. In crosscutting to the footwall at the 700 and 800 levels some of the most valuable ore was found. The mine is being put in condition to ship regularly. It has been in charge of Supt. R. J. Walter the past year.

Boulder, May 19.

CLEAR CREEK COUNTY.

(Special Correspondence).—The heavy fall of snow and rain in the month of April filled the underground water courses and as a result the mines of the district have an unusual surfeit of water, to handle which the pumps, in numerous instances, are inadequate. This condition has retarded operations to some extent. The month of May, however, will show a large tonnage handled by the samplers and concentrators.

The Sun & Moon, whose shaft contained about 100 feet depth of water, is being pumped out. After it is unwatered the shaft will be sunk deeper with air drills. A shipment of eighty tons of ore was recently made to a concentrator.

The Newhouse tunnel, now in 8500 feet, takes a straight course, a little west of north, has a grade of 4½ inches to the 100 feet, is 12x12 feet in size, contains double car track of 30-pound rails. When carried to completion its terminus will be north of the Concrete mine, at Central City. Its course takes it under Seaton mountain, Russell Gulch and Quartz hill, the aim being to make the tunnel accessible from the mines in the localities named. The rock penetrated thus far is a mica schist and porphyry dykes. The rich body of steel galena recently struck, about which much has been said, is about 8500 feet from the tunnel entrance and 2300 feet below the surface of the Gem and Gem Extension and the Freighter's Friend. The discovery in the tunnel is important, demonstrating, as it does, the great width and richness of ore at 2000 feet depth. By it is proven that in this case, at least, the "values go down." The ledge discovered is claimed by the Gem Extension and Freighter's Friend owners, who believe the following of their vein to great depth will prove it to be identical with the one opened in the tunnel.

The Gem and Gem Extension, under the management of W. E. Renshaw, are opened by an incline shaft 600 feet deep, which recently has been retimbered thoroughly by square sets from top to bottom and with stulls in the stopes. A skip of 2500 pounds capacity operates in the incline on a 32-inch gauge by a steam hoist.

The Freighter's Friend, managed by John Owens, has a 200-foot shaft, with levels run at various stations.

The Trust, belonging to Hiatt Bros., has a 90-foot incline, in which a vein from 6 inches to 2 feet wide, with a pay streak 3 to 6 inches wide, running $60 to $100 per ton in gold, silver and lead.

The property of the Seaton Mountain M. Co., on the southern slope of Seaton mountain, is being vigorously worked through a 1200-foot tuunel, at the breast of which a connection has been made with the old workings from a vertical shaft. A drift on the vein has also been run 500 feet from the tunnel. The tunnel runs northward, the vein which it cuts running east and west and pitching to the north. Shipments amount to about ten tons per day, the bulk of which is sent to concentrators. The ores are a lead-zinc sulphide, whose chief values are silver and lead. New ore bins are being erected at the mine and Manager J. J. May states that it is the intention to use electric power as soon as same can be procured.

The Crown Point & Virginia shaft is 715 feet depth, the lowest working level being 585 feet deep. A new hoist and compressor are being put in, with the intention of sinking deeper. The new hoist is 12x16, double geared. This company is operating the old Wilkie mill, which they have increased to a capacity of sixty tons per day, and Supt. W. H. Knowles states that it is the intention to further increase it to 150 tons capacity, making it a complete concentrating plant. At the mine a new shaft house and ore bins are being erected. The ores are an iron and copper sulphide, carrying, gold, silver and copper. At present the mill is being operated on ore from the dump formerly discarded.

The Gold Discovery Co., owning the Dove's Nest mine, is unwatering the property at present. Their shaft is 635 feet deep, with drifts both ways therefrom at each 100-foot station. The ores are iron and lead sulphides, the lead values predominating. Manager E. C. Eddie states that the property shipped about 3000 tons of good ore in 1899, and that shipments are soon to be resumed.

The Jackson concentrating mill, chiefly owned and managed by J. G. Roberts, is handling about forty tons of ore per day. Its equipment of crushers, coarse and fine rolls, Huntington mills, jigs, slimers, buddles and tables is of a kind well suited to the ores of the district. It enables them to make numerous gradations of the material handled and suit each grade to the process best adapted to it. For instance, the jig product is separated by sizers, part going to the rubber belt slimer, a part to the Cammett tables, the second from the latter going to the buddles. The slimer, which is 32 feet long and 5 feet wide, catches the light slimes from the three 14-mesh jigs. The results are very satisfactory to the miner.

Idaho Springs, Colo., May 16.

FREMONT COUNTY.

At Florence the new chlorination mill being erected by the Union G. Ex. Co. will be the largest in the State. The company will employ about 200 men at $2 per day of eight hours. The storage room will have a capacity of 6000 tons for reserve. This company intend to purchase their ore, like other custom mills, as they own no mines, and the ore will be from the Cripple Creek district. The chlorination room will be 30x208 feet, the roaster building 100x300, the electric power house 75x75. There will be 210,000 square feet under cover. The mill will be automatic from the bedding floor to the chlorination barrels. An electric pump will be placed in a reservoir in the bed of the Arkansas river having a capacity of 500,000 gallons each twenty-four hours, the amount required. J. E. Rothwell is superintendent of construction.

GILPIN COUNTY.

(Special Correspondence). — The East Whiting mine on Seminary hill is shipping twenty-five tons per day to the Mixsell mill at Idaho Springs. Frank H. Clark is Supt.

The Gunnell mine is now working a force of about 100 men and produces about 125 tons of ore per day, all of which is milled. The 1100-foot shaft is being sunk to the 1300 level. Most of the present output comes from below the 1000-foot level.

The Central City, in charge of John J. Reilly, is shipping 150 to 200 tons per month. The Delaware is shipping 350 tons per month to concentrators at Idaho Springs.

The Kansas-Burroughs is keeping up a shipment of about 4000 tons per month.

It is expected the Phœnix shaft of this company will soon be sunk from 1200 to 1300 feet. Most of the ore from this group is milling material.

The New York mill, in charge of W. H. Coffin, recently put up new ore bins, with facilities for receiving ore either from the district tramway line or from ore wagons. They also have provided trackage and elevators, by which the ore is carried to crushers and from the latter to the stamps. They now have fourteen automatic feeders. This mill has fifty slow drop and twenty rapid drop stamps, which operate by water power. Its capacity is 150 tons per day. WASCOTT.

Central City, May 19.

At the California mine the water is gaining. On Sunday 271 barrels of water of 400 gallons each were hoisted from a depth of more than 1700 feet.

The East Whiting mine on Gunnell hill is reported sold for $100,000 to Abbott & Joy of Salt Lake, Utah, and A. H. Baldwin of New Orleans.

HINSDALE COUNTY.

Supt. Ray will build a mill on the Tobasco, near Lake City.

The Contention mine is sold to the Megunticook G. & C. M. Co. for $30,000.

HUERFANO COUNTY.

A rich strike is reported on the Lyle B. claim, owned by the Rossdale T. & M. Co., on the western slope of Mount Blanca. At the 50-foot level a vein of ore is said to assay $500 per ton.

LAKE COUNTY.

(Special Correspondence).—The Sedalia shaft, now 790 feet deep, will be sunk 150 to 200 feet deeper, with the idea of cutting the lower contact.

An effort is being made to effect a consolidation of the Home M. Co. and the New Leadville M. Co., a proposition vigorously opposed by many of the Home stockholders. A meeting of the stockholders of the Home Co. will occur in June, at which the question will be decided. The Home Co. is now reducing 400 tons of ore per day from its three different shafts.

The Maid, Small Hopes and Moyer each produce a heavy zinc tonnage, much of which is shipped abroad. A shipment of 2000 tons was made the last few days to a zinc smelting plant in Belgium.

It is estimated the output of Leadville mines for May will aggregate 100,000 tons, which is fully double the monthly tonnage of 1898. The metals which make up the marketable product of these ores, worth about $1,500,000 per month, are gold, silver, lead, manganese, zinc and copper.

Leadville, May 20.

J. H. Weddle will enlarge the Union Smelter at Leadville.

OURAY COUNTY.

Manager Benson of the Camp Bird, Ouray, is arranging for a cyanide plant of 100 tons daily capacity, to be in operation July 15. The mill will have eight leaching tanks, each with a capacity of fifteen tons of ore, and four solution tanks. The tailings to be treated will be raised with a sand pump to the leaching tanks. There will be two sets of tanks, one for a strong and the other for a weak solution. The ore requiring a particular strength of solution can be treated at any time without waiting for a cleanup of the mill.

SAN JUAN COUNTY.

(Special Correspondence).—W. F. Kendrick of Denver is here this week and has satisfactorily and definitely arranged all matters in connection with the erection here of a 200-ton pyritic smelting plant.

Silverton, May 16.

(Special Correspondence).—It is given out that a wire-rope tramway will be constructed from the North Star mine to the Crook mill—a distance of 4 miles. The first purpose of such a conveyor is to enable the operators to mill the great tonnage of ore on the North Star dump.

Silverton, May 20.

SAN MIGUEL COUNTY.

Telluride Journal: The net profit of the Butterfly–Terrible mine from the first nine days' run with twenty stamps was $1880, in bullion and concentrates. It is proposed to add a cyanide plant and to begin shipments of smelting ore.

TELLER COUNTY.

A. E. Beal has returned to Cripple Creek from California and organized the Cripple Creek H. M. Co., in which he says W. S. Tevis of San Francisco is heavily interested. The company is incorporated for 1,500,000 shares. It is proposed to sink a three-compartment shaft 1000 feet and prospect from that depth under the city of Cripple Creek.

Victor says that W. S. Stratton has offered $200,000 for the Pharmacist mine.

IDAHO.

ADA COUNTY.

Marsh & Moss have bonded to W. E. Pierce & Co., agents of J. R. De Lamar, four claims in Miller mountain district. In sixty days, if the mines make the showing desired, $10,000 is to be paid, and at the end of the year $50,000 is to be paid.

KOOTENAI COUNTY.

E. L. Abrams, Gen. Mgr. Idaho G. C. M. Co. of Cœur d'Alene, intends to equip the mines with a steam hoist and four-drill air compressor plant and erect permanent buildings.

OWYHEE COUNTY.

Engineer Johnston's report on the Snake river dam is favorable, and work will begin immediately, says Supt. Hutchinson of the Trade Dollar Con. M. Co. to the Silver City Avalanche. The enterprise contemplates the damming of Snake river at Swan Falls, some 6 or 8 miles above Guffey, to generate electric power for transmission to the Owyhee mines and mills. W. White of Boise will be in charge of the work as Supt., A. J. Wiley will be chief engineer, T. Johnston will be consulting hydraulic engineer and L. B. Stillwell consulting electrical engineer. A rock crib dam, giving a fall of 15 feet, will be put in and the power generated with turbine wheels. The possible H. P. will be 12,000, but only 1500 will be installed. The power will be transmitted 26 miles to Silver City and distributed to various plants.

SHOSHONE COUNTY.

At Murray the Golden Chest has stopped shipping its concentrates—twenty tons per month. They are being sorted at the mill, and a small cyanide plant will be put in.

The Cœur d'Alene Development Co. will put a hoisting plant on the Silver King mine in Government gulch, near Wardner.

MICHIGAN.

At Houghton the Arcadian strike was settled by the company granting increase of $4 per month to trimmers and miners and making time 1 o'clock Saturday afternoons.

The new $100,000 stamp mill of the Mass M. Co. will be on Keweenaw bay, 16 miles of Houghton, at Ogima. R. T. Mason will be Supt. of construction.

MONTANA.

JEFFERSON COUNTY.

A miners' union will be formed at Richmond Flat. It is stated that Mgr. Knox, of the Monitor and Revenue properties, proposed to pay miners $3 per day, which is 50 cents less than the former price in that district.

LEWIS AND CLARKE COUNTY.

Supt. Burrell, Montana M. Co., reports as the result of mining and milling ore and the treatment of the tailings for six months, the total receipts were $344,679, and the expenses of operation $282,567. Operations were continued at the dam tailings plant from July 1 to December 20, a period of about five and two-thirds months, during which time there were treated 69,573 dry tons of tailings from dam No. 4a, from which a net profit of $84,621.48 was realized. The large tonnage of very fine material (slimes) which is at present being separated from the coarser sands will be worthy of attention after the sands, which are amenable to the present process, have all been passed through this plant. There can be no doubt that a substantial profit can be realized from these slimes by making some mechanical changes in the present plant after the material now being treated has been exhausted. There is also another very likely source of revenue to be derived from the operation of this plant at some future time, that is in the treatment of all the fine sands left in the gulch from the placer mining which was done years ago. This would require the handling of all the gravel washed by the old sluice-box methods, and a system of sizing by some economical modern machine. The values would first be determined by sampling, and this could be readily done when the water of the creek was not in use for other purposes, as it is at present. My opinion is that there would be a very satisfactory recovery of the coarse gold by the adoption of the usual method of sluicing over riffles the gravel left in the old workings, and then leaching the remaining fine sands to recover the fine gold. The development of the mine consisted of 3500 feet of shafts, drifts, crosscuts, upraises and winzes, at a cost of $53,066.44, or $2.15 per ton of ore treated. "I regret to be again obliged to report an unsatisfactory condition of affairs in the mine. The great disappointment met with in our development at the No. 3 shaft part of the mine brings with it the grave fears of not being able to keep the mill employed while we are endeavoring to solve the complications connected with our work. There are two principal points of attack left to be explored, the first in importance being No. 3 shaft, Nine Hour. Our winze, through which this work is being done, is now very near the 1200-foot level, and within a few days we shall be drifting south on this level. The other point is the New Castletown, 600-foot level, which should be driven 600 feet more to prove what there is in the ground. Until this work has been done I am not prepared to say what the next half year may have in store for us."

MADISON COUNTY.

M. W. Alderson, at Leiterville, will put in a small refinery to send out his gold dust as bullion, instead of shipping it for refining.

Thos. Teal, Mgr. Twin Bridges smelter, says that the shut down was for alterations in the plant.

The Kennett mine at Virginia City is closed down and all the men discharged. Mgr. Millard says the cessation of work is but temporary.

NEVADA.

CHURCHILL COUNTY.

F. W. Inman says he has tin ore 25 miles east of St. Clair, at Sand Springs, that has 17.53% tin. He asserts that ore sent to Swansea, Wales, gave such returns.

LANDER COUNTY.

Ex-U. S. Treasurer A. J. Gilfillen and Matthew Vassar of Vassar College have bought for $30,000 the properties of the Battle Mountain M. Co. There is said to be considerable ore that would yield 5% copper, $3 in gold and a fractional amount in silver.

LINCOLN COUNTY.

The Miners' Union of De Lamar raised over $700 for the widows and orphans of the Scofield, Utah, mine accident.

NEW MEXICO.

BERNALILLO COUNTY.

(Special Correspondence).—Arriving at Santa Fe over the Denver & Rio Grande Railway, the writer proceeded westward 40 miles to the Cochiti mining district, crossing the Rio Grande at the old Cochiti Indian Mission, which was established more than three centuries ago, the relics of whose adobe and cement covered buildings stand as a reminder of historic days. The Cochiti mining district lies at a point on the eastern slope of the Cochiti range, 10 to 12 miles west of the river crossing referred to. The district covers an area of 4 by 5 miles, near the heads of three parallel canyons which drain eastward to the river, known as Pino, Colla and Peralto canyons. The main wagon road goes up Pino to the town of Bland, above which is the Lone Star mine, belonging to the Navajo G. M. Co., and a mile below town is the mill of the Bland M. Co. At the mouth of this canyon is the mill of the Cochiti Reduction & Improvement Co., whose mine, the Iron King, endlines with the Lone Star above Bland. Three miles south of Bland, in Colla canyon, is the Albemarle mine and mill, belonging to the Cochiti G. M. Co.; farther to the south is Peralto canyon, in which are numerous mining locations and near the head of which is the water supply of the Albemarle property, the water being piped by gravity to mine and mill 7 miles. (See page 577).

At the Madrid coal mines, near Cerrillos, on the Santa Fe R. R., is the electric power plant of the Cochiti G. M. Co., enclosed by a steel building, with asbestos lining. The 600 K. W. three-phase generator is driven by an 800 H. P. direct-connecting Corliss steam engine, the fuel used being screenings from the coal yards. At this power plant the 600 volts are transformed to 20,000 for line transmission to the sub-station at the Albemarle mine, 31 miles distant. Here step-down transformers reduce the voltage back to 550, which is the voltage used on the motors. The pole line is of three No. 4 wires for current transmission and two No. 12 wires for telephone work. The transmission circuit is transposed every half mile and the telephone circuit every five poles. The poles are 28 feet long, set 5½ feet deep, 30% of the number being in solid rock.

At the mill and mine are electric motors of various capacities. The belted, two-stage air compressor is operated by a 175 H. P. motor; the double drum hoist over the mine shaft is run by a 100 H. P. motor, giving a rope speed of 1000 feet per minute. The mill is operated in two sections, each by a 150 H. P. motor, by which each section may operate independently of the other; two motors of 20 H. P. each operate the Pelatan–Clerici equipment, and there are two or three 10 H. P. motors for various other work.

The Albemarle ledge trends north and south through a porphyritic formation and is 75 feet wide in some places. It is opened by an incline shaft which follows the dip of the vein to 500 feet depth. At each 100-foot station a drift from 200 to 500 feet from the shaft has been run, the ore being taken out from wall to wall, showing remarkable width. In various places the ledge is divided by porphyry horses, leaving vein matter of 10 to 30 feet wide next to each main wall, making it appear like parallel veins. The ore is a hard, whitish quartz, considerably oxidized, containing little sulphurets, carrying gold chiefly and some silver. The mine is in condition to produce a large tonnage of ore.

Over the shaft is a steel gallows-frame, erected specially for incline work. The ore passes through an ore bin over grizzlies, separating the fine from the coarse. It is conveyed in cars to the crushing floor of the mill, where there are two crushers, below which are four sets of 26-inch and four sets 36-inch rolls, through which the hard quartz passes; the talcose and loose material is carried direct to four Huntington mills. The product of the rolls undergoes a thorough process of screening, thence through revolving driers, and after passing through the finishing rolls is carried to the leaching tanks, where the straight cyanide solution is applied. The material from the mills is treated in eight vats by the Pelatan-Clerici process. In the leaching department of the mill are twelve 120-ton tanks, six of 60 tons each, and eight tanks of 200 tons each, making a leaching capacity of 3100 tons. As equipped at present the mill can crush from 8000 to 9000 tons per month. At the point where this mine and mill are located the canyon is very narrow and has high and precipitous sides, leaving no abundance of room for buildings and deposition of tailings. The mill is operating, but not at its full capacity, though it is expected too soon.

In Colla canyon the Lone Star, or Navajo, mine occupies the northern slope of the mountain and is developed by a system of tunnels, one above another, which crosscut the ore body at the vertical distance of about 100 feet apart. The lowest tunnel is now being driven. It is in 575 feet and is expected to cut the ore body at 900 feet from entrance and 200 feet below present lowest workings and at a point 700 feet below the vein apex. The property was opened six years ago on its upper levels, from which $60,000 worth of ore was hauled to the railroad and shipped to the smelters. Then only the high-grade ores were sought and large bodies of what may be designated as milling ore were left exposed. On the upper levels great chambers were worked out near the surface, showing a vein expansion to over 100 feet in width in places. On the lower levels the vein is more regular, between well-marked porphyry walls, and ranging from 10 to 30 and 40 feet wide. The ores are sulphides, arsenides, antimonides and tellurides. The silver is found mainly in the antimonial ores; the tellurides are in the sylvanite and petzite forms. It is stated that by fine pulverization, roasting will not be required and that the requisite saving can be made by cyanide work. The Bland mill has been running much of the time for the purpose of working out the problem of extracting the values from these ores.

In the lowest working level a small hoist is operating by compressed air in sinking 200 feet to the level of the new tunnel. This shaft is 850 feet from the surface horizontally. Plans are being made by the Navajo Co. to erect a 300-ton mill at a point 1½ miles down the canyon and will connect mine and mill by an electric tramway. As soon as the lower tunnel shall have been completed and a connection made with the upper workings, all the ore will be handled through it. The Cochiti G. M. Co., the Navajo G. M. Co. and Bland Milling Co., while each operates under a separate organization, are all under the same general management. Hence, the electric power for the proposed Navajo mill and other equipment will be furnished by the Cochiti power plant described above. The Bland mill has ten stamps and cyanide process.

The Cochiti Reduction & Improvement Co., under the management of W. C. Wynkoop, has just completed a pan amalgamation and cyanide mill at Woodbury, at the mouth of Colla canyon. The mill has three sets rolls 12x24 and 16x30, White-Howell roasters, pans and settlers. When cyanide is used it is decomposed by zinc-copper amalgam in the pans. An electrolytic current from a low voltage dynamo is used to aid in decomposing the cyanide and in precipitating the gold on the quicksilver in the pans. The ores from this company's mine, the Iron King, are siliceous, 85% to 90% insoluble, with values contained in an arsenical pyrite, being about 40% gold and 60% silver. The pyrites carry about 1½% sulphur, ¼% arsenic. The gold occurs as metallic, is readily amalgated, but the silver is extracted with greater difficulty. The mill at Woodbury has not at this writing begun operating.

In general, the ores of the district, taken as they are mined, without sorting, run from $12 to $15 per ton, of which gold predominanes in some mines and silver in others.

Mr. Johnson is manager at the Albemarle, V. V. Clark at the Navajo; O. P.

Posey is general manager of the Cochiti, Navajo and Bland Companies.

The D. & R. G. is said to have let large contracts for railroad ties, which is construed to mean that they will build out of Santa Fe toward Bland. The Cochiti & Northwestern Railway Co., organized by Maj. J. H. Purdy, has projected a railway line from Thornton to Bland, though actual work of grading for it has not begun.

Bland, April 27. WASCOTT.

SOCORRO COUNTY.

(Special Correspondence).—Socorro, 76 miles south of Albuquerque, is in the valley of the Rio Grande, at an altitude of 4500 feet, and is the location of the New Mexico School of Mines. This institution has a well-planned stone building, which is well equipped and fitted up with appliances for instruction, has about sixty students in attendance and four instructors. About $9000 per year have, of late years, been appropriated for the expenses of the school. Near town is the abandoned Rio Grande smelting plant, which ran in former years on ores from the Kelly and other mines in the Magdalena mountains.

The railroad branch, running westward from Socorro to Magdalena, 28 miles, makes an ascent of over 2000 feet. The latter town, located on a level plain, four miles from the foothills of the Magdalena range, is a trading point for the miners and for stockmen for a long distance westward. The little town of Kelly, at the foot of the range, is 1000 feet higher than Magdalena.

The principal mines of the district are opened on the western slope of one spur of the range, the veins having a north and south trend. Such mines as the Graphic, Kelly, Ida Hill, South Juanita and Hardscrabble appear to be of most importance.

The Kelly was a heavy producer from 1882 to 1888, under the management of G. Billings, its owner. It is now under lease to Connelly & Babcock, of Kelly, who are shipping a small tonnage and doing considerable of dead work for development purposes.

The South Juanita, under lease to Courtney & Thorpe, is shipping 75 to 100 tons per month from three different levels in a 135-foot shaft. It is asserted their ores contain from three to five ounces silver and about 35% lead in form of carbonates and sulphides.

The Ida Hill group is being operated by Byron & Fitch, lessees, who ship 200 to 400 tons per month of carbonate ores, bearing about an equal quantity of iron and silica, making it a neutral ore from a smelting estimate.

The Graphic mine and Graphic smelter have been operated several years by Capt. A. B. Fitch, lessee, with Max B. Fitch Supt. of smelter and Geo. A. Byron Supt. of mine. The smelter and mine are a mile and a half apart, connected by an ore-car tramway line of railroad gauge, part of which is built on a 10% to 15% grade, making a descent from mine to smelter of 500 feet. At one point is a curve on a 50-foot radius and 10½% grade. The loaded cars, holding 2½ to 3 tons each, are sent down to the smelter by gravity, the speed being regulated by hand brakes. The empty cars are drawn up to the mine by horse power and are loaded through chutes from ore bins, which receive the ore from the main working tunnel.

The mine is opened by means of six levels of the vertical distance of about 100 feet apart, which are connected by means of chutes and inclines. This work discloses what appears to be one vein in the upper levels, and two parallel veins from the third to the sixth, the one great ledge having been divided by a limestone strata from the third downward. The veins have a 45° dip westward and are from 5 to 50 feet wide, standing within a limestone belt, and the latter bounded by shale on one side and by an altered quartzite on the other. The ores comprise iron in the forms of pyrites, red and brown hematites, magnetites and lead in carbonates and sulphides, with important silver values with the lead; there are small copper values which are taken into account by the smelter. On the sixth level a body of zinc sulphide is encountered at or about water level, none of which is being taken out at present. In the lead-carbonate sections a high-grade tonnage of "sand carbonates" are obtained, which consist of lead crystals of sand fineness. The different forms of iron ore, which occur in large bodies, are mined and sent to the smelter as a fluxing material only, as its lead-silver values are very small. The two upper levels are on the one vein, but from the third downward, there being practically parallel veins, the two are connected by crosscuts through the lime horse. Stopes have been carried from level to level, showing a very regular wall formation in most places and is timbered up with stulls. The mine is producing from 75 to 100 tons of material per day, which goes down to the smelter as ore and flux. Near the main tunnel entrance are great lime quarries, from which such lime as is required by the smelter is cheaply obtained.

The Graphic smelter, equipped with a 42x120-inch lead furnace, 18 feet from tuyere to charge floor, has a capacity of 100 tons per day, counting fluxes. The product is about ten cars of bullion per month, as well as a small amount of copper matte. The furnace has no flue dust chamber, the stack continuing the same inside dimensions for 18 feet above feed floor and on account of this height of furnace charge there is little flue dust. Steel plate water-jackets are used, to which water is fed by branches from a 3-inch pipe line. The hot water from the jackets is pumped to a reservoir having a device for cooling it, and after being cooled it is used over again. The water supply is pumped from a well in a draw near by. The charge for the furnace is figured to produce a slag of definite composition, the following being a fair example: SiO_2=30; FeO=32.5; CaO=18.5; total, 81. An interesting and unusual fact concerning the Graphic is that the mine furnishes practically all the material required by the smelter.

The Hardscrabble mine, belonging to virtually the same parties who operate the Los Cerrillos smelter, ships its ore output to the latter plant. WASCOTT.

Magdalena, May 1.

OREGON.

GRANT COUNTY.

Near Prairie City of the Oregon Wonder a Spokane correspondent says: "At the point of location it stands up in a solid ledge over 300 feet above the surface of the earth, and lies across a hog back, and can be tunneled either on the ledge or across the vein."

JACKSON COUNTY.

J. S. Howard, chief engineer High Line ditch, that is expected to bring water from Rogue river to Gold Hill, says the work of digging the 4-foot berme on the right of way is progressing, several miles being already prepared for excavation on the Gold Hill end. A right of way has been granted the company by the Southern Pacific Co. for a 50-foot strip 35 miles long. There now remain but a few rights of way to be obtained along the 93 miles of line. When this right of way has been secured contracts will be let for digging the ditch in 10-mile sections.

UTAH.

BOX ELDER COUNTY.

The Promontory M. Co. is incorporated with a capital stock of $50,000. T. D. Johnson is secretary. The company owns the King Philip and eight other mining claims.

JUAB COUNTY.

Mgr. Farnsworth tells the Miner that plans for fifty stamps for the Bullion-Beck mill have been perfected.

SALT LAKE COUNTY.

At Bingham, J. S. Grow will next week begin work on the Baltimore group of claims.

Tribune: The new electric motor of the Bingham Tunnel Co. has been placed in the central station, and preparations are going forward to install the big air compressor. Work on the tunnel has been very slow, owing to the hardness of the rock which has been encountered 2200 feet from the opening, from 10 to 12 inches a shift being all that can be accomplished. The work of driving the tunnel will be hastened by the use of the machine drills, and the company expects to be able to drain the Dalton & Lark mine in about seven months' time. By the means of a 12-inch pipe which ventilates the tunnel, all danger of foul air is reduced to a trifle, and by means of a fan suction all the smoke from the blasts is drawn away. The tunnel will enter the Dalton & Lark properties 300 feet below the depth reached by the shaft.

WASHINGTON.

FERRY COUNTY.

The Manila property is bonded to P. Clark and a contract let to run 400 feet of tunnel. The Manila M. & M. Co. is incorporated at Keller.

OKANOGAN COUNTY.

(Special Correspondence).—Last June a company composed of Chicago and Washington State residents acquired a group of fifty mining locations and three mill sites on Palmer mountain, 6 miles north of Loomis, and incorporated the Bull Frog G. M. Co. (See pages 573 and 580.)

Palmer mountain at this point rises 4500 feet above the shore of Palmer lake, 3500 feet of which ascends at almost 45°, the Bull Frog group being located so as to extend from the lake up the side and taking in a portion of the top of the mountain, in form of 5000 feet east and west and 7500 feet north and south. Running through this ground are sixteen parallel cropping veins in a northeast and southwest direction.

The principal work has been done on the sixteenth vein, or the one farthest up the mountain, and consists of about 250 feet of tunnel work and a vertical shaft 130 feet deep, from the bottom of which a crosscut drift has been run 219 feet to cut the vein, and in so doing they encountered ore 85 feet from the shaft, a well-defined foot wall, and from there on to 219 feet, where a well-defined hanging wall was encountered, five ore bodies were crossed of between 4 and 12 feet in width, while the formation between was more or less mineralized. Drifting was then started on all five of the ore shoots, and the past three months has demonstrated almost beyond question that these ore bodies all run into one vein, which assays $4 to $12.50 in gold, averaging $8 in gold, with some silver and iron.

When the Bull Frog Co. was organized they also acquired what was known as the Wyandotte cyanide mill, which they are now removing to one of their mill sites on Palmer lake to treat this ore. Before so doing, however, they ran a quantity of ore taken from this sixteenth vein through the mill, and found that it yielded to that mode of treatment, as, for instance, in one run of eleven tons assaying $19.50 gold $17.50 was saved.

Before striking this ore body it was the intention to run a crosscut tunnel which would cut these sixteen veins at 2000 feet depth, but the quantity of ore now in sight permits them to develop the other veins at their leisure, and they will put a power hoist on the sixteenth vein and build a tram from mine to mill and begin active mining and milling. This is perhaps one of the most important developments that has been made on Palmer mountain in width of vein and quantity of ore.

The Black Bear–War Eagle Co., who have been putting the Black Bear mine and mill in shape, have made a thirty days' cleanup from five stamps on a run of 300 tons of ore, the result being 470 ounces gold saved by amalgamation, and ten tons of concentrates of the value of $150, making the ore value about $30 per ton in gold. The shaft is now down at the Bear mine 250 feet, with drifts each way to veins No. 1 and 2, where drifts are being run each way on the vein, and 500 feet of new stoping ground has been added in the past sixty days. They are developing far ahead of present needs for mill supplies.

Fifteen more stamps are to be added, and a hoist and 20 H. P. gasoline engine will be placed on the War Eagle, and a shaft put down to 500 feet, with levels each 100, on the main vein. They will also continue the Bear shaft to 500 feet depth this season.

In the crosscut tunnel being run at the Wehe Consolidated a second vein has been crossed, 6 feet in width, carrying good ore. The hoist will soon be in place on the Wehe vein, and the shaft continued from the 200-foot level, where it now is, to 500 feet. This vein has been cut at 200 feet and found to be 14 feet wide. Many improvements and much work are in contemplation, which will be taken up when the managing directors arrive here the coming month.

The Palmer Mountain tunnel has reached a length of 3100 feet, gained 1225 feet vertical depth, and crossed twenty-two veins from 2 to 40 feet wide. The company have now nearly reached their first objective point, that of cutting the vein which crops on the Helena Belle location, and one of the strongest showings on the mountain, it being agreed that no active mining would be done or method of treatment adopted until this point was reached. Plans are formed for development of these veins, as well as the improving of their water power electrically, giving them 3000 H. P. if desired, and the erection of a plant for treating the ores, which will probably include a combination of stamps, concentration and cyaniding, requiring an outlay of $250,000 and a year's time to fully complete.

The present year has seen the starting of three mills in the district, aggregating twenty-five stamps, which produced for the thirty days of April about $40,000 from 2000 tons of ore, exclusive of the values in the concentrates. These mills are now adding sufficient stamps to increase the output to $100,000 monthly, which they will do within ninety days. The whole district is assuming a decidedly permanent system of development of ores, and treating the same upon economical and latest gold mining methods, and is doing as much in the way of bringing the State of Washington into prominence as a gold producer as any camp in the State, and is unique in one respect, viz., a total absence of stock speculation, every property being developed on its merits.

Loomis, May 1. JOHN I. BOOGE.

STEVENS COUNTY.

At Northport furnace No. 3 is blown in at the smelter. Ore is received from Rossland at the rate of 500 tons daily.

SPOKANE COUNTY.

R. K. Neill of Spokane has secured control of the water power at Post Falls and proposes to erect a $500,000 electric power plant there, to furnish power for the operation of the mines in the Cœur d'Alene country, wires to be strung 65 miles to Burke, Idaho.

FOREIGN.

BRITISH COLUMBIA.

In the Grand Forks district the Jewel mine in Long Lake camp will put in a cyanide plant.

Development work on the Winnipeg mine to date exceeds 3500 feet.

The new tunnel on the Snowshoe in Wellington camp is in 160 feet.

The spur to the Brandon & Golden Crown mine in Wellington is completed. The ore bins are full awaiting cars for the smelter. The main shaft is down 322 feet and the total work on the property is about 2250 feet. The plant comprises a seven-drill compressor.

At Rossland the Evening Star has a seven-drill compressor plant, an air pipe line from the compressor plant to the working of the Evening Star, with two power drills at work.

Near Rossland the War Eagle and Center Star mines have let new mining contracts and now have almost a full complement of men. All the work in the War Eagle is being done from the fifth to the seventh level.

Two strikes are reported in the Kamloops mining district: the first on the Wheel Tamar, group copper gold ore, averaging 8% copper and fair gold values: the other on the Tenderfoot at Copper Creek: bornite ore, showing grey copper.

CANADA.

The Ontario Government's mining bill abolishes all royalties on minerals, but provides that the Lieutenant-Governor-in-Council may impose a mineral tax on the gross quantity of the ore mined. The tax will be at the following rates:

Iron 50 cents per ton; zinc $5 per ton, or $15 per ton of metal contents if partly treated or reduced; copper $2 per ton or $25 if partly treated or reduced; nickel $10 per ton or $60 if partly treated or reduced; copper and nickel ore $7 per ton, or $20 and $50 a ton, respectively, per ton of metal contents if partly treated or reduced; all other ores, such rates as may be imposed by order-in-council, but not to exceed 5% of the selling prices thereof in a free market. A license, to cost $10, shall be necessary to mine any of the metals for which a license is imposed. It is provided, however, that where such ores are smelted or treated in the Dominion of Canada, in such a way as to yield fine metals, or any form suitable for direct use in the arts without further treatment, the tax may be remitted. The tax will not apply to mines where the annual output of ore is less than 500 tons. A further provision in reference to the tax is that by proclamation it may be remitted, or a lower rate substituted in case of ore or minerals refined in the United Kingdom, or any British colony or dependency. Another clause ratifies the order-in-council providing that all lands patented or leased will contain the conditions that the ore be refined in Canada.

A number of further clauses contain

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provisions which are intended to safeguard the miners in the use of explosives, the internal working of the mines, and a complete code of signals for hoisting and descending the shaft. All reservations of mines, ores and minerals contained in patents issued prior to July 1, 1897, are to be rescinded.

Personal.

J. H. BROWNLEE of Atlin, B. C., has returned from San Francisco.

H. B. C. NITZE is at Rico, Colo., examining the Atlantic Cable mine.

J. B. MOULTON is now local manager N. A. G. D. Co., Breckenridge, Cal.

EDWARD BAER succeeds Wm. Seltz as Supt. Golden Chest mine, Murray, Idaho.

B. F. JANES of Berkeley, Cal., is considering an offer to go to Guayaquil, Ecuador, S. A.

A. R. LEDOUX of New York City is examining mining property at Gilt Edge, Mont.

H. WEBB AND HANS C. BEHR left San Francisco on the 19th inst. for South Africa.

J. L. GIROUX, manager United Verde mines, Jerome, Ariz., has returned from Sonora, Mexico.

SUPT. F. MILLS of the Merced M. & M. Co., has returned from San Francisco to Coulterville, Cal.

H. P. GORDON of Plymouth is one of the 1000 California miners who sails this week for Cape Nome.

S. P. DORSEY has been elected Pres. and Supt. Maryland, Cal., M. Co.; L. V. Dorsey secretary and treasurer.

O. B. BACHMAN is manager American M. D. Co.'s copper properties at Plain View, ten miles from Globe, Ariz.

GEORGE J. HOFFMAN of San Francisco has again gone to Siberia, to examine and report upon placer properties.

R. J. PROVINES, formerly of the Golden Cross mill, Hedges, Cal., is Supt. Boston & Denver mill, Blackhawk, Colo.

A. D. GASSAWAY, late Supt. Magnolia mine, is Supt. DeLong river mines, on the North Fork, Placer county, Cal.

HUBERT VISCHER of the California State Debris Association has returned to San Francisco from El Dorado, Cal.

CHAS. SWEENEY of Spokane, Wash., says he will this summer put a 50-stamp mill on the Big Buffalo, Idaho, mine.

LEO VON ROSENBERG of New York City is examining California mining property. He is in San Francisco this week.

R. C. SHAW, late Supt. Warrington M. & M. Co., Havilah, Kern county, Cal., has gone to the Bellavista & Thayer M. Co., Costa Rica, C. A.

L. C. GRIFFITH of Atlin, B. C., was in San Francisco this week, buying $12,000 worth iron pipe for one of that region's extensive hydraulic enterprises.

I. N. HIBBARD, Gen. Supt. Alaska Exploration Co., and H. A. Brigham, Supt. mining department, sailed on the Zealandia for Cape Nome on the 21st inst.

H. W. FAIRBANKS of Berkeley, Cal., accompanied by Arthur Halloran of San Francisco, started this week on a geological reconnoissance of northern California and eastern Oregon and Washington.

COL. D. H. JACKSON, the veteran California and Nevada miner, goes to Cape Nome—one of the old Argonauts who goes ever onward in search of the golden fleece. He is accompanied by his son Clyde.

A. DOLGUROUKOFF is in San Francisco in the interests of the Russian-American Commercial Co., a part of whose plans is to develop some Siberian mining concessions recently acquired. An exploring party is being formed, which will be accompanied by G. D. Roberts.

A. HAYWARD AND C. D. LANE have returned to San Francisco from Angels, Cal. The latter goes this week to Cape Nome. He says: "Most people think the beach sands are all that is up there. They are important, but I am not interested in them at all. All our diggings are in the hills and the gold is coarse."

Recently Declared Mining Dividends.

Standard Con. M. Co., California, 10 cents per share	May 21
Buffalo Hump M. Co., Idaho, dividend 1%	June 1
Independence T. & M. Co., Colorado, 1 cent per share	June 1
Westlake Oil Co., California, 2%	May 25
Pennsylvania Oil Co., California, 2½%	May 19
Gray Eagle Oil Co., California, 55 cents per share	May 28
Gold King, Colorado, 3 cents per share	June 20

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING MAY 15, 1900.

649,817.—PULVERIZER—C. W. Day, Santa Cruz, Cal.
649,541.—ROTARY ENGINE—J. W. Flowers, S. F.
649,829.—TRAP GUN — A. H. Forstner, Salem, Or.
649,602.—ROCK DRILL—Greene & Brady, S. F.
649,607.—NEEDLE FILLING MACHINE—J. E. Inman, Kalama, Wash.
649,854.—MOUTH DILATOR — J. A. W. Lundberg, S. F.
649,466.—GAS GENERATER—L. Mayhew, New Whatcom, Wash.
649,873.—SPIKE PULLER—F. Newnham, Los Angeles, Cal.
649,874.—FLOWER HOLDER—T. Payne, Los Angeles, Cal.
649,706.—LOCK — B. Phelps, Seattle, Wash.
649,646.—TRUSS—D. S. Plum, El Dorado, Cal.
649,547.—ROCK DRILL PISTONS—P. H. Reardon, S. F.
649,548.—ROCK DRILL SLIDES — P. H. Reardon, S. F.
649,551.—ELECTRIC LIGHT CARBON — J. F. Sanders, Portland, Or.
649,878.—BICYCLE GEAR—P. J. Scharbach, Woodburn, Or.
649,648.—DRYING APPARATUS — C. R. Splivalo, S. F.
649,881.—HYDROCARBON BURNER—C. R. Sutton, Carpenteria, Cal.
649,561.—PIANO ACTION—J. L. Wilson, Los Angeles, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AUTOMATIC LOCKING MECHANISM FOR SIDEWALK OR OTHER ELEVATOR DOORS.—Peter H. Jackson, San Francisco, Cal. No. 648,624. Dated May 1, 1900. This invention relates to an automatic mechanism for securing and releasing elevator hatchway doors, and is especially applicable to the doors which close over sidewalk elevator platforms or hoists. It comprises details hinged to the hatchway frame and closable to meet on the central line, a vertical movable elevator platform, guided slidable locking bolts adjacent to the edges of the doors, said bolts having right and left screw threads cut upon their inner ends, a revoluble journaled sleeve or turnbuckle having corresponding threads within which the bolt ends fit. A weighted lever is connected with this and turnable by the rise and fall of the elevator platform so as to withdraw or advance the bolts. A curved bail is fixed to the elevator platform, and when this starts to rise, it contacts with the weighted lever, turns it so as to withdraw the bolts, and the continued upward movement of the bail with the platform separates the doors and opens them when the platform and the bail descend, after the latter has passed below the line of the doors the latter commence closing and finally close as the bail descends still lower and this allows the weighted lever to act to force the bolts into their sockets.

ROCK DRILL.—E. M. Greene and Wm. Brady, San Francisco, Cal. No. 649,602. Dated May 15, 1900. This invention relates to improvements in rock drilling apparatus. It consists of one or more cylinders with pistons and means by which the pistons are connected with the drill so as to move in unison therewith. Explosive vapor is admitted, compressed and ignited in the cylinder or cylinders to impel the drills forward for the stroke, and an independent power mechanism is applied for returning the parts after the stroke has been delivered. In connection with this is a suitable valve mechanism by which the explosive gas is admitted alternately to each of the cylinders so that the first one and then the other acts to impel the piston. The gasoline power drill has great advantages over the present drill. It will do away with engine, boiler and air compressor, as the power will be used directly on the drill. It is expected that it will do as much work as the present power drill does, and it will be placed in the hands of the miner at a price that the miner of small means can reach. The miners using the drill will have the power with them using it directly on the drill, thereby doing away with an engineer, and the cost of the power itself will not be one-twentieth part what the power costs to run the present power drill where wood or coal is used to produce power. The field for such a drill is great, on account of so many miners being unable to purchase the expensive outfit now required. Drawings for a full sized power drill are now in the hands of the builder.

Latest Market Reports.

SAN FRANCISCO, May 24, 1900.

SILVER—Per oz., Troy: London, 27⅝d (standard ounce, 925 fine); New York, bar silver, 60c (1000 fine); San Francisco, 60c; Mexican dollars, 49½c.

COPPER.—New York: Lake, 1 to 3 casks, 16.75 cash; carload lots, 16.50; Electrolytic, 1 to 3 casks, 16.75; carload lots, 16.25; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $3.85; Salt Lake City, 3.87½; St. Louis, $3.85; San Francisco $4.70, carload lots, 4¼c 1000 to 4000 lbs.; pipe 7, sheet 8, bar 6c. London, Soft Spanish Lead, £16 15s = 3.65c per lb.

SPELTER. — New York, $4.45; St. Louis, $4.55; San Francisco, ton lots, 6c; 100-lb lots, 6c.

ANTIMONY. — New York, 10c; San Francisco, 1000-lb lots, 11c; 300 to 500 lbs., 12@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 40@45c ℔ lb.

IRON. — Pittsburg, pig, No. 2, foundry, $21.50; gray forge, $20.00; San Francisco, bar, per lb., 3c.

STEEL. — Billets, Pittsburg, $29.50; sheet bars, $34; San Francisco, bar, 11c to 18c per lb.

QUICKSILVER. — New York, $51.00; London, £9 10s; San Francisco, local, $51.50 ℔ flask of 76½ lbs. Export rates withdrawn.

BISMUTH.—New York, ℔ lb., $1.70 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

TUNGSTEN.—New York, ℔ lb., $1; San Francisco, $1.25.

FERRO-TUNGSTEN. — New York, 37%, 40c; San Francisco, 75c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, $125.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

SOLDER. — Half-and-half, 100-lb. lots, 20½c; San Francisco, Plumbers', 100-lb. lots, 17c.

TIN.—New York, pig, $28.75; San Francisco, ton lots, 31½c; 1000 lbs., 32c; 500 lbs., 33c; less, 34c; bar tin, ℔ lb, 37c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

NICKEL.—New York, 45@50c ℔ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 33@35c ℔ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 66° B, 2c ℔ lb.; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 24, 1900.

9:30 A. M. SESSION.

200	B. & B.	30c	200 Sierra Nev. 34c
200	Chollar	20c	100 Silver Hill. 31c
500	Mexican	28c	600 Union. 29c
100	Overman	20c	1100 Utah. 11c

2:30 P. M. SESSION.

500	Ophir	59c	2000 Utah. 12c
200	G. & C.	15c	200 . 11c
300	B. & B.	30c	100 Silver Hill. 30c
100	Union Con.	20c	50 . 29c

Commercial Paragraphs.

J. C. EVENS AND W. J. STENENSON have opened an assay office in Denver, Colo.

AT Victor, Colo., the Economic mill will put in twenty-one Wilfley tables, double-deckers.

ALVIN PHILLIPS & Co. have opened assaying and ore testing works at 1761 Market street, Denver, Colo.

THE Oakland, Cal., Iron Works has bought a lot, 150x100 feet, on which to build an extension of the plant.

THE Water Works Board, Brisbane, Queensland, Australia, are in the market for 165 tons of 4, 6 and 9-inch cast iron water pipe. Bids will be received up to June 30.

R. N. STEWART, representing electrical houses at Denver, Colo., recently furnished sixty Belden alternating current, enclosed arc lamps of 2000 C. P., to the town of Rawlins, Wyo.

THE Truax Manufacturing Co. have been so crowded for floor space that they have been compelled to secure a larger building at No. 69 Stevenson St., San Francisco. The company has lately shipped an order of twenty-six cars to Mexico and twelve large cars to Arizona. A number has also been sent to Alaska. They write: "We have a great number of letters from all over the country which mention the MINING AND SCIENTIFIC PRESS."

UNDER date of the 15th inst., the Edward P. Allis Co. of Milwaukee, Wis., writes: "It does not seem to be generally known among mine owners that the Edward P. Allis Co. of Milwaukee conducts well appointed mining machinery departments in connection with their New York and Chicago offices. We wish you would announce to your readers that users of mining machinery can be served from our New York office, No. 95 Liberty St., and Chicago office, 509 Home Insurance Bldg., with the same efficiency as from the Milwaukee office."

Books Received.

"The Transvaal Trouble" is a booklet by John Hays Hammond, published by the Abbey Press, New York City, and sent for 25 cents. In it Mr. Hammond discusses the South African imbroglio as an American citizen from an American standpoint, and says that England is fighting the Boers for the same principles that the American colonists fought England 120 years ago.

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: **EDWARD N. BREITUNG,** MARQUETTE, MICH.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

Quicksilver

——FOR SALE BY——

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET, SAN FRANCISCO.

Mill Plans, Cyanide, Concentration, Smelting, Sampling.
F. D. BAKER,
Mechanical Engineer,
420 Boston Building.....DENVER, COLO.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

WANTED.

Wanted,

Reliable parties to join other reliable parties in a fine quartz prospect. References exchanged. Address A. F., this office.

WANTED,
A Developed Copper Property.

A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.
H. B. RUNKLE, Mining Broker, El Paso, Texas.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75 00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.
C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

LOCOMOTIVE WANTED FOR CASH.—

One 36-in. Gauge, Saddle Tank preferred. Cylinder about 9-in. diameter by 14-in. stroke, or larger. Also, One Steam Shovel. Would consider purchasing Little Giant Traction. In replying, send full specifications, including age, present condition, location and lowest cash price. Address CONTRACTOR, 1603 Monadnock Block, Chicago.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Robert Hill, in the Gardner's Point Mine, near Port Wine, Sierra Co., to deposit tailings in Saw Mill Ravine; from Chas. Hilton, in the Dry Gulch Placer Mine, near Pleasant Valley, El Dorado Co., to deposit tailings in Clear Creek; from L. Foss, in the Woodchuck Mine, in Gold Lake Mining District, Sierra Co., to deposit tailings in Woodchuck Ravine; and from the Golden Hill Mining Co., in the Golden Hill Mine, near Powellton, Butte Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on June 11, 1900, at 1:30 P. M.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the National Cons. Mining Company will be held at the office of the company, 773 Mission St., San Francisco, California, on MONDAY, the 4th day of June, 1900, at the hour of 3 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting.
GEO. W. FLEISSNER, Secretary.
Office—773 Mission St., San Francisco, California.

Atlin Gold Fields,

British Columbia. Of particular interest to HYDRAULIC OPERATORS and experienced QUARTZ PROSPECTORS. American miners can pre-empt claims. For further particulars write BROWNLEE & LOWRY, Civil and Hydraulic Engineers and Land Surveyors Atlin, British Columbia.

ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

EFFECTING ECONOMY IN
Steam and Power Plants
IS MY BUSINESS.
DOES IT INTEREST YOU?
Howard H. Fielding.
1328 Seventeenth St., DENVER, COLO.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

SITUATIONS WANTED.

MILLMAN OF 15 YEARS' EXPERIENCE WISHES SITUATION. Can give best of references. Address D. F., this office.

COMPETENT CYANIDE MAN AND ASSAYER open for engagement. Best of references. Also an experienced AMALGAMATOR. Address "South," care Mining and Scientific Press.

WANTED—POSITION AS SUPERINTENDENT HYDRAULIC MINING PROPERTY.
Thoroughly qualified in all its branches. Over twenty years' experience. References. Address "Mining Superintendent," care this office.

WANTED.—Position as superintendent, or to take charge, by a thorough practical miner and mechanic of eleven years' experience. Good draughtsman. Opening up new properties a specialty. Copper or gold mining preferred. Good references. Address B. C., care of Mining and Scientific Press.



M. S. HAUSER,
Room 38, 12 Front St., San Francisco, Cal.
Will act as purchasing agent for mining companies. Will use the benefit of his wide experience in getting the best articles at the lowest prices, securing low freight rates, and prompt delivery. Will submit estimates on all kinds of supplies. Will work for either a small salary or a commission, and show a saving greatly in excess of charges.

FOR SALE.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Staloknecht, Durango, Mexico.

A Large Hydraulic Mining Property For Sale,

Comprising 274 acres and having water rights, ditches, reservoirs, etc. Ground has averaged for thousands of cubic yards of gravel over 22 cents per cubic yard. The property is offered for sale on favorable terms, for the closing of partnership affairs, and in consequence of the death of principal owners. There are no complications; U. S. patents for title. Facilities for restraining dams good; U. S. Debris Commission rights for dams granted. Every facility given for thorough investigation. For further particulars apply to ALMARIN B. PAUL, Agent for Eastern owners, 27 Crocker Building, San Francisco.

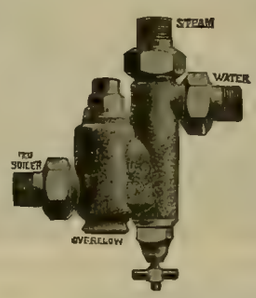
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3500 feet of 16-inch, 5 B. W. G. National Tube Works seamless pipe. Kimberly joints. Immediate delivery.
Address P I P I, Room No. 140, No. 32 Broadway, New York City.

STEEL RAILS FOR SALE.

300 tons 30-lb. Relaying T Rails; 40 tons 25-lb. Relaying T Rails; 30 tons 20-lb. Relaying T Rails; 10 tons 12 and 16-lb. New T Rails. 1 Porter Saddle Tank, narrow gauge. Correspondence solicited.
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TRADE MARK

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.
MESSRS. MADISON, BRUCE & SELLERS,
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For Water Works, Mining and Irrigation Plants, Drains, Electrical Conduits. No Corrosion—Electrolysis Proof. Will Not Rust—Alkali Proof. Cheaper Than Iron.
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FOR TOOLS, MINING DRILLS, ETC.
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Wm. Jessop & Sons, Ltd. Manufactory, Sheffield, England.
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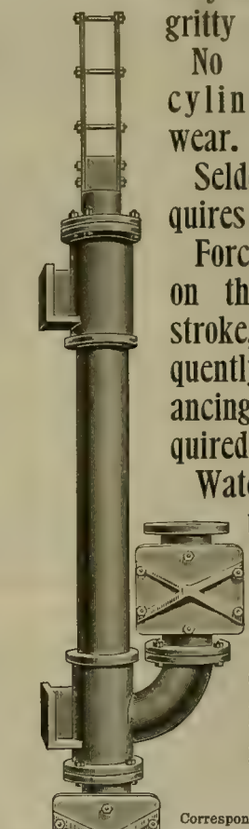
That is what they say about our new Jackhead Plunger Pump. Especially adapted for pumping very muddy or gritty water.

No smooth cylinder to wear.

Seldom requires packing.

Forces water on the down stroke, consequently no balancing bob required.

Water column can be perfectly and inexpensively balanced.



Correspondence solicited. Tell us your conditions and we will quote you on size and kind of pump that will suit you best.

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PATENTS

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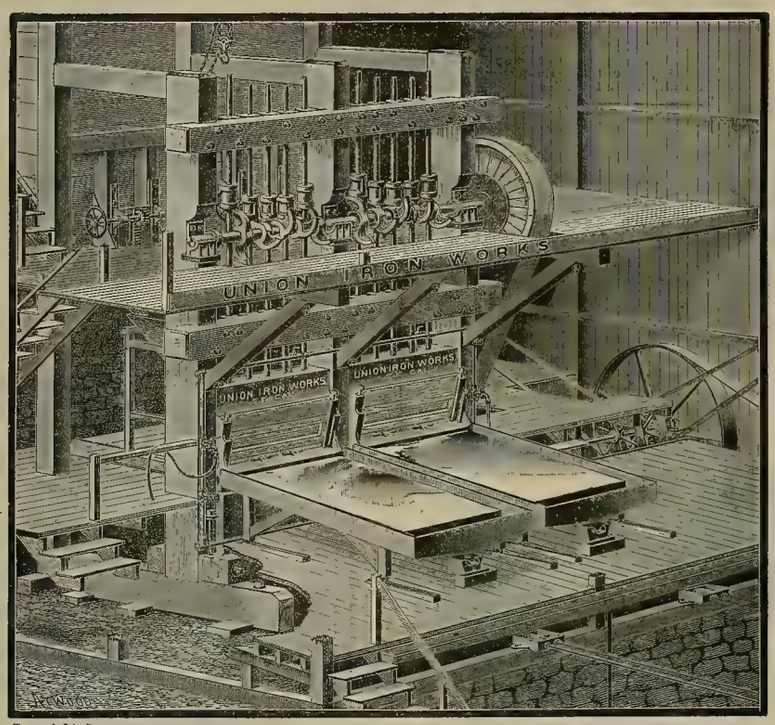
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BUILD THIS

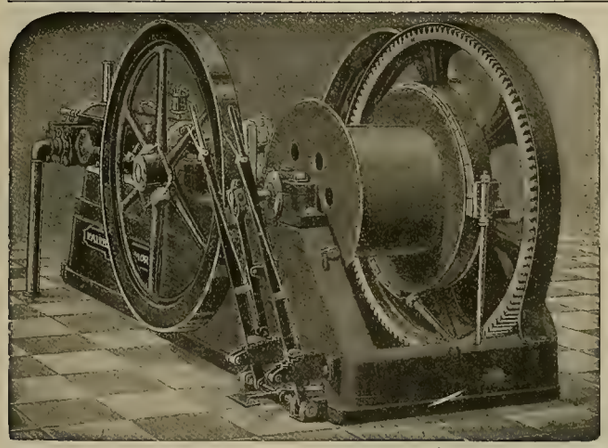
MODERN TEN-STAMP BATTERY.



Copyrighted.

The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

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FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

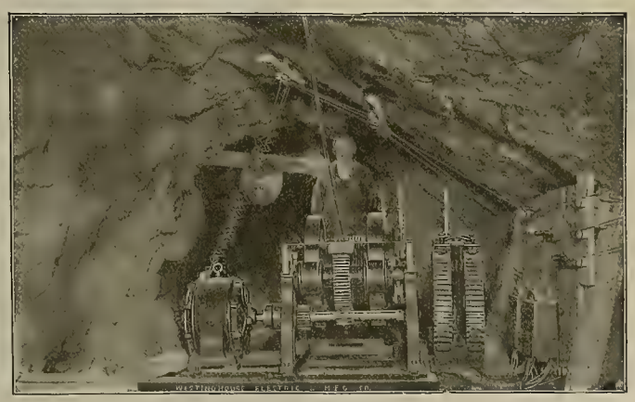
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ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

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1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.



MINE HOIST.

138-F

BUILDERS OF

Electric Mine Equipments

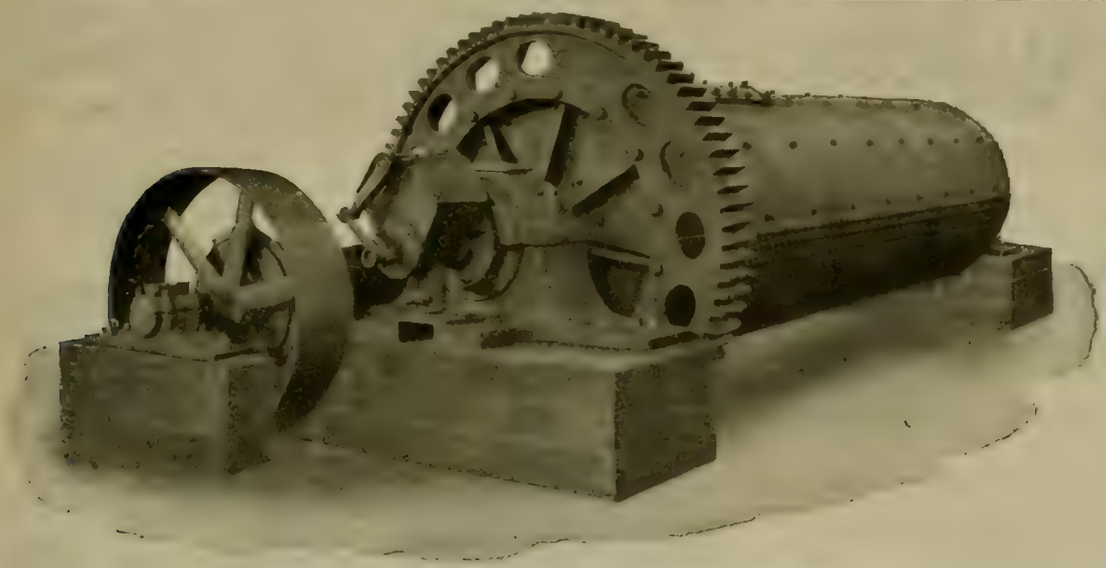
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Mine Pumps
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Mills Building, San Francisco. All Principal Cities in U. S. and Canada.

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Sole Manufacturers of the

Clark Patent Tube Mill.

The simplest and most durable machine for very fine grinding of ores either wet or dry.

Catalogue No. 15 describes it.

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Up-to-date Miners who value their lives use McINTYRE'S DRY BATTERY

PORTABLE ELECTRIC SAFETY LAMP.

ABSOLUTE SAFETY is Assured All Users.



NO. 2 LAMP.

This is an Electric Lamp set in a White Enamel Parabolic Reflector, and can be attached to the cap or any part of the clothing by means of a stick-pin attached to reflector and connected to the battery with a flexible cord. The battery is arranged to be carried on a belt or in the pocket. So the user has free use of hands. The current can be turned off when not in use. Dry batteries are used and can be recharged from direct Incandescent Electric Current. Charger and full directions go with each Lamp.

IS USED BY THE FOLLOWING:

For Watchmen, Miners, Mine and Gas Inspectors, Oil and Gas Works Employes, Powder Mills and Warehouses where explosive materials are manufactured and stored. where it is impossible to carry an oil lamp or candle for fear of explosion, and all parties requiring a safe portable light. The whole outfit is neat and compact.

No. 1 weighs	2 lbs.,	1½ C. P.	Price complete,	$4.50.	For meter reading only.
No. 2	"	3	"	4	"	"	6.00.	For Miners and general use.
No. 3	"	12	"	10	"	"	"	12.00.	For several persons to work by.
No. 4	"	3	"	4	"	"	"	6.00.	Boiler Makers and Chimney Sweeps.

SAMPLE LAMP SENT ON RECEIPT OF PRICE. Illustrated Catalogue is yours for the asking.

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HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES, BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES, GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS, WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS, EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS, SNOW STEAM PUMPS, QUIMBY SCREW PUMPS, GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS, SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

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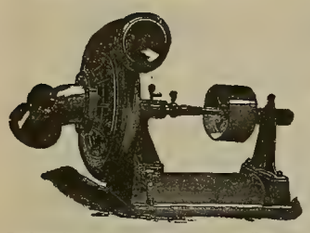
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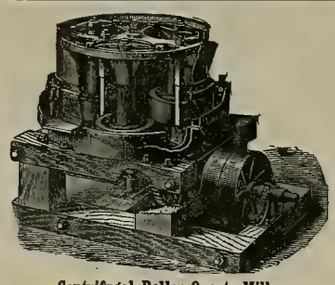
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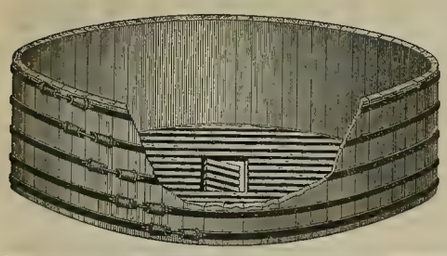
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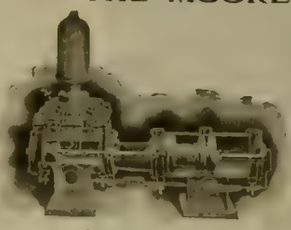


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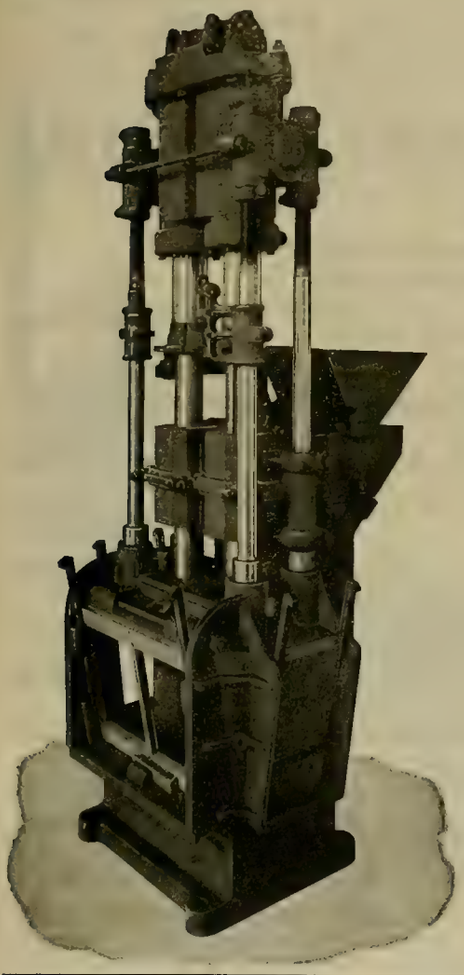
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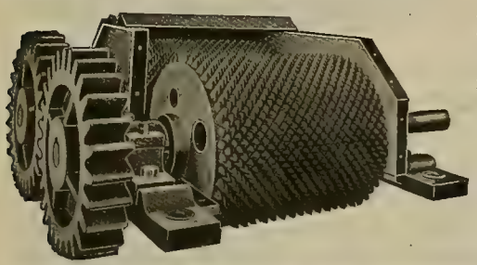
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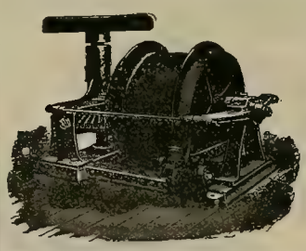
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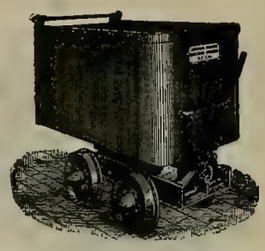
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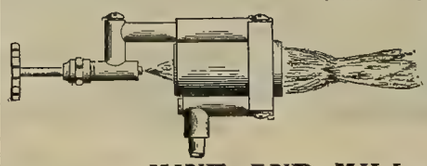
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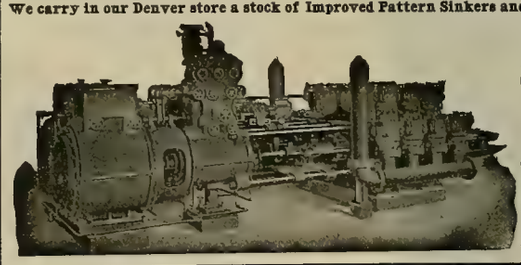
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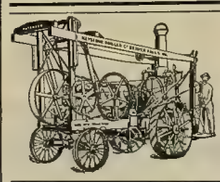
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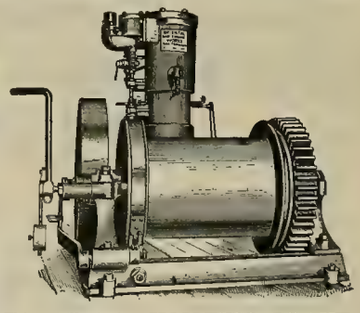
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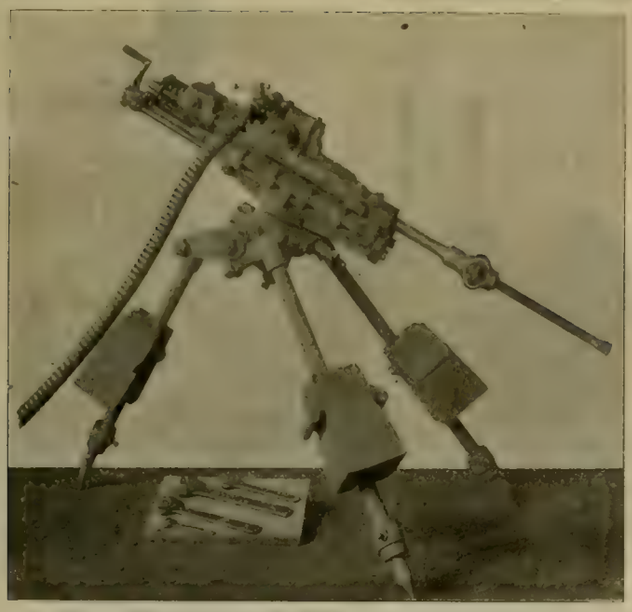
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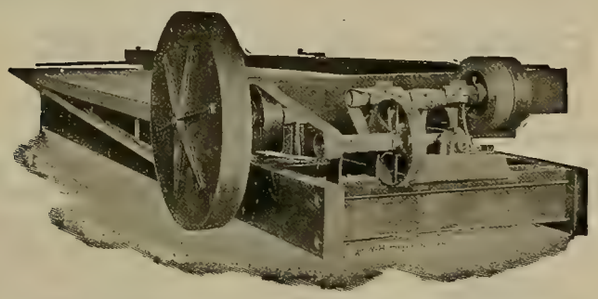
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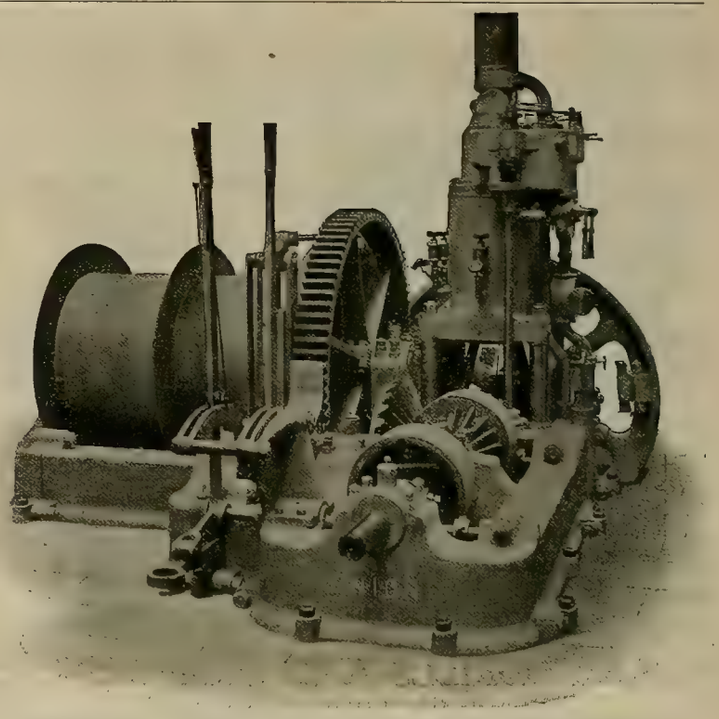
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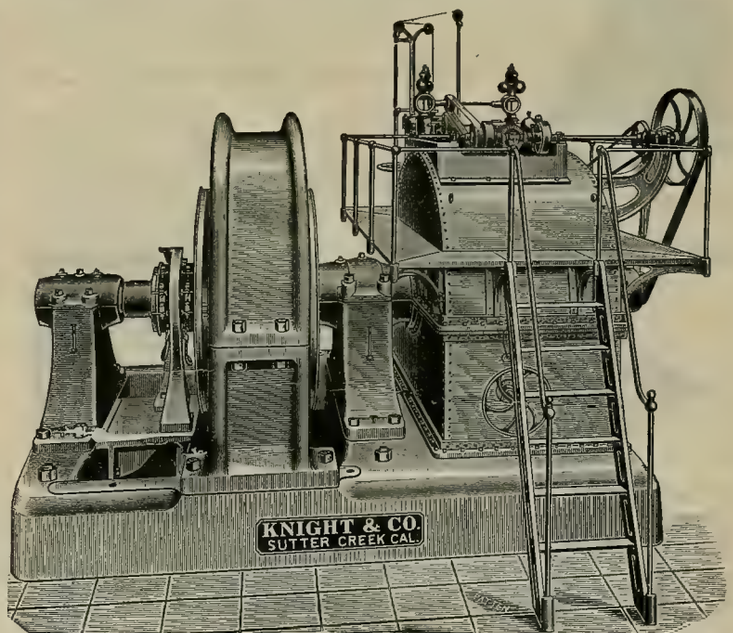
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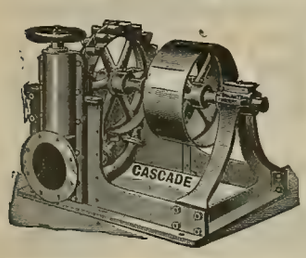


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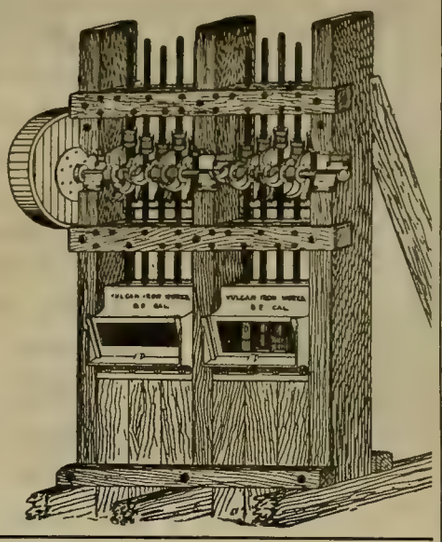
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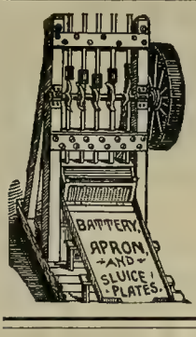
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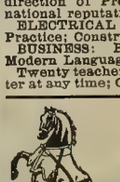
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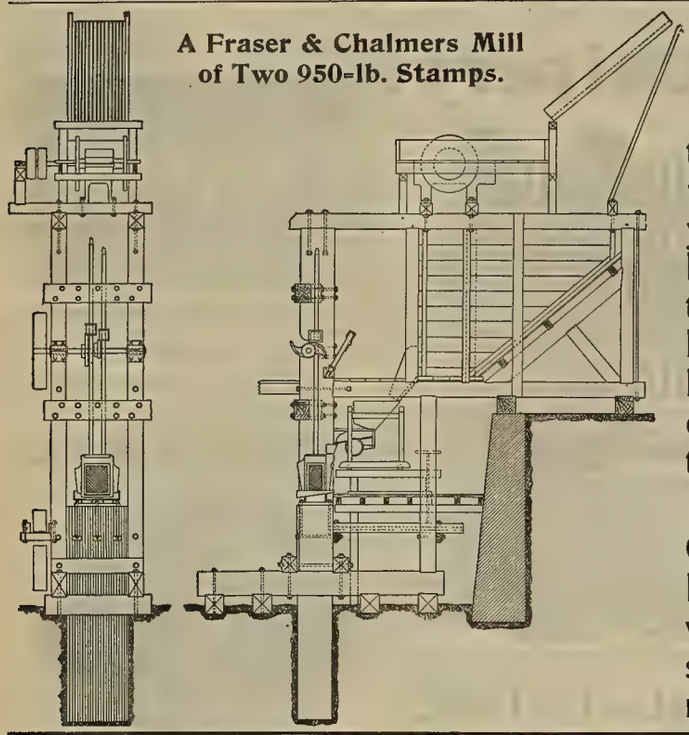


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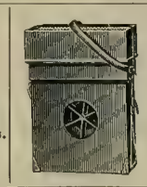
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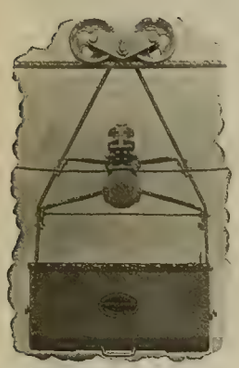
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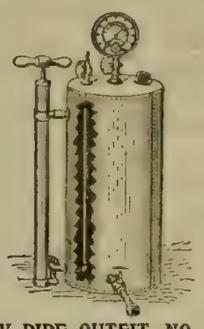


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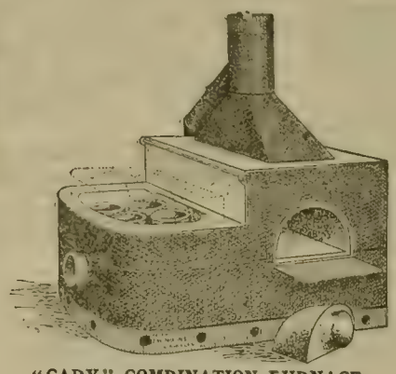
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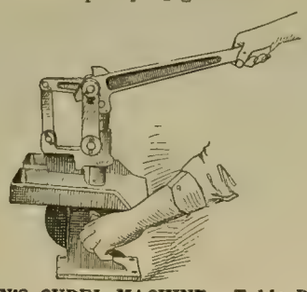
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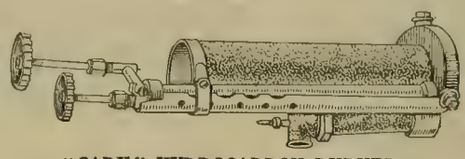
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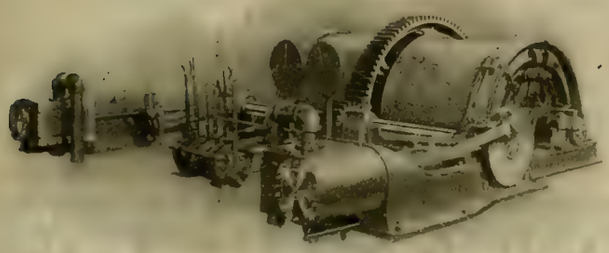
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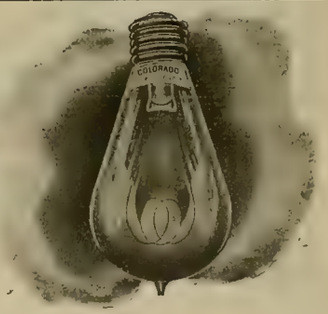
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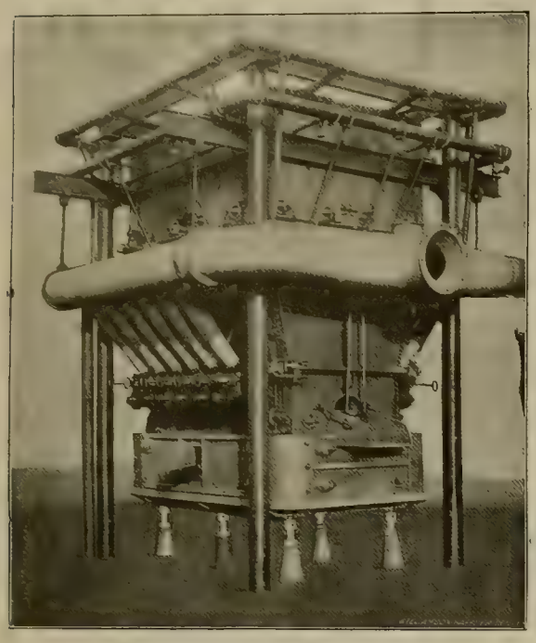
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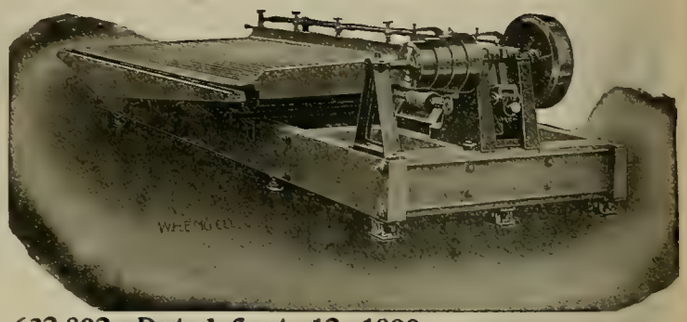
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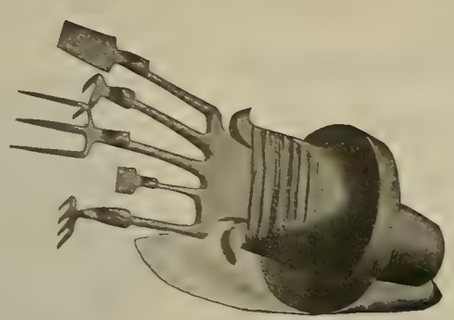


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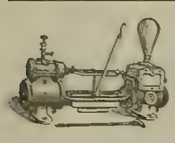
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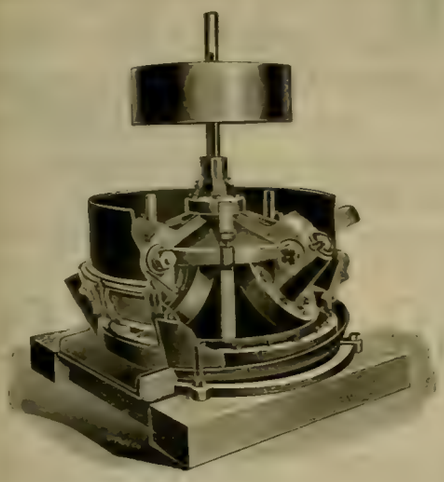
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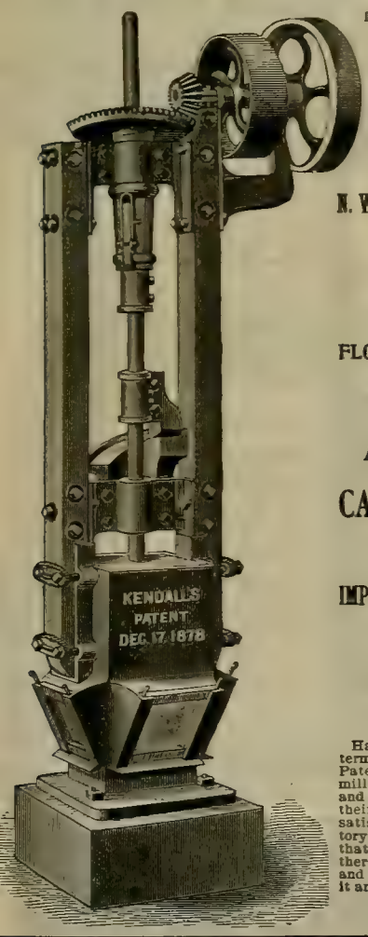


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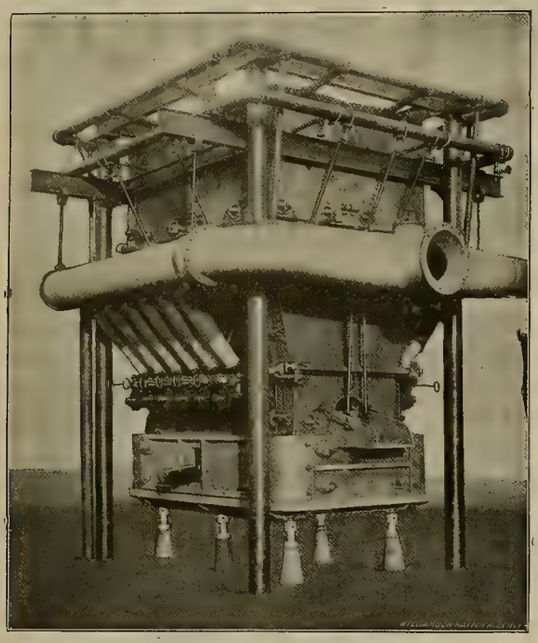
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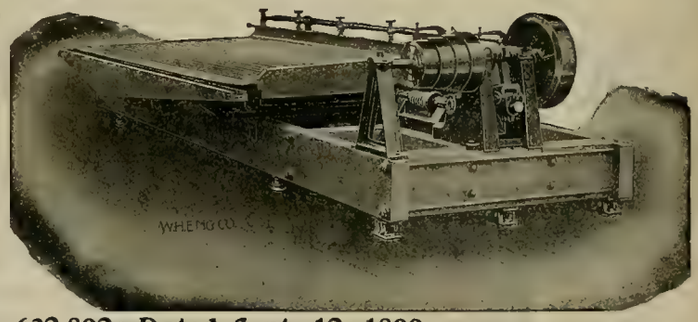
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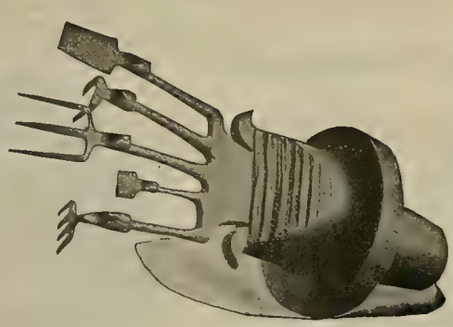


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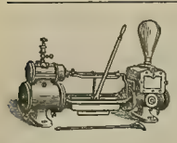
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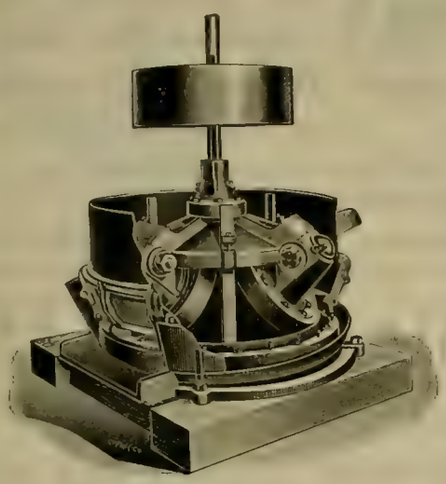


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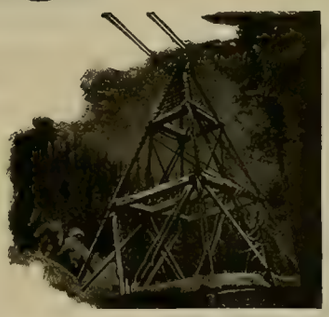
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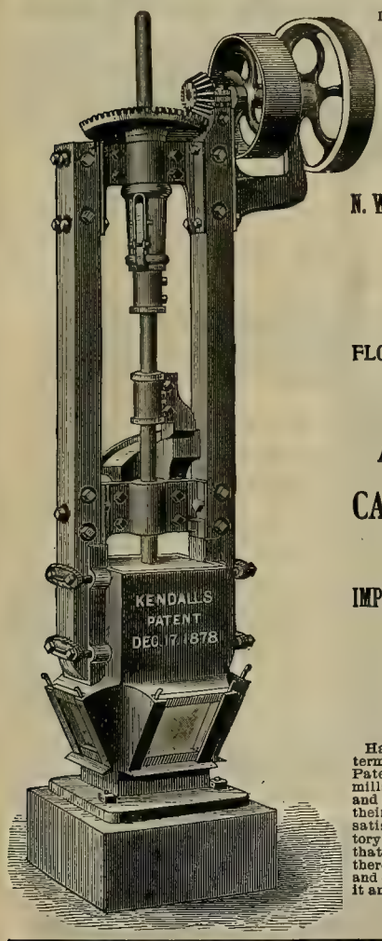


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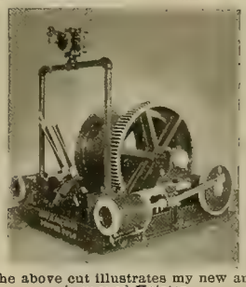
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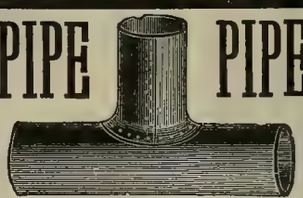
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H. Heckmann, Trustee.....	70	200	4 00
H. Heckmann, Trustee.....	71	200	4 00
H. Heckmann, Trustee.....	72	200	4 00
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William Dieffenbacker.....	100	200	4 00
William Dieffenbacker.....	101	200	4 00
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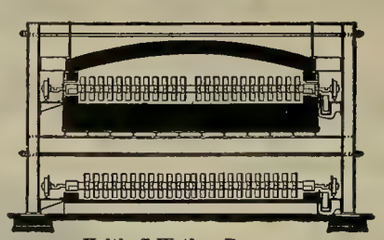
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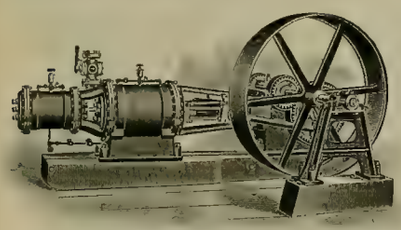
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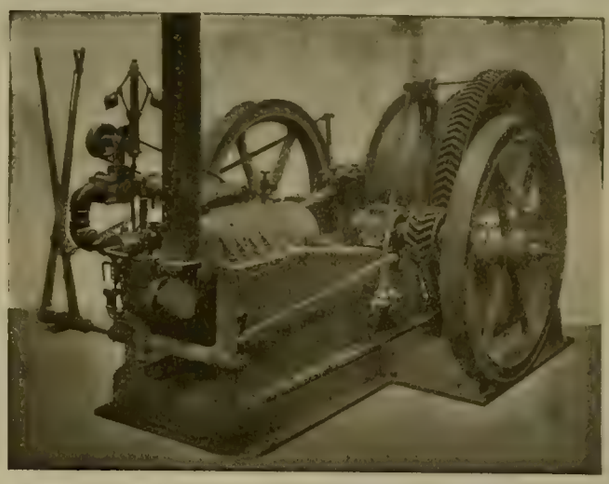
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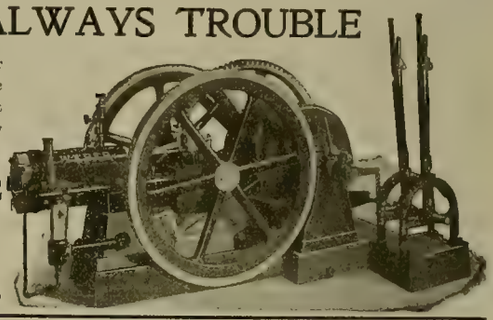
HERCULES HOISTS Are Sold the World Over.



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.
HERCULES GAS ENGINE WORKS,.....141-143 FIRST STREET, SAN FRANCISCO, CAL.

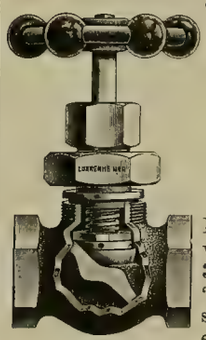
THERE IS ALWAYS TROUBLE

with a second-class Gasoline or Oil Engine or Hoist, and there is no good excuse for buying that kind when the Weber is so easy to get. Write for particulars.



WEBER GAS & GASOLINE ENGINE CO.,
430 S. W. Boulevard,
Kansas City, Mo.

REGRINDING VALVES



On U. S. Battleships, Cruisers, Torpedo Boats, Locomotives, Lake and River Boats, In Power Plants, Factories, Rolling Mills, Refineries, Everywhere You Will Find

THE LUNKENHEIMER REGRINDING VALVES.

Extensively used. They have no equal for high-class service. In screw and flange ends, ⅛ to 4 inches for 175 and 350 lbs. working pressures. If you want them *specify* "Lunkenheimer" make, and see that name is cast in shell; none genuine without. Supplied by dealers everywhere. Catalogue gratis.

THE LUNKENHEIMER CO., Cincinnati, Ohio, U. S. A.,
SOLE MANUFACTURERS.

BRANCHES: NEW YORK, 26 Cortlandt St.; PHILADELPHIA, Bourse Bldg.; LONDON, S. E., 35 Gt. Dover St.; MEXICO CITY, Puente de San Francisco No. 6.

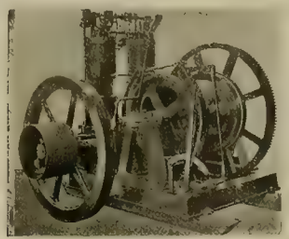


.·.The Two Essentials.·.

The two essentials for a successful engine are Steam and a **Detroit Lubricator.** The steam furnishes the necessary energy and the **Detroit Lubricator** insures that almost all of this energy will be converted into useful work—not wasted in overcoming friction. We make different styles of lubricators to meet the different conditions existing in the various types of engines, so that all are enabled to work at their best and waste and wear are reduced to the minimum.

Our new catalogue is just out. It describes our full line of **Sight Feed Lubricators, Glass and Brass Oil Pumps, Glass and Brass Oilers, Multiple Oilers, Oiling Devices, Valves, Etc.,** and it will be sent to any part of the world on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.



Mining Hoist.

THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other **AT LESS COST.**

MANY IN USE, Giving Satisfaction.

Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

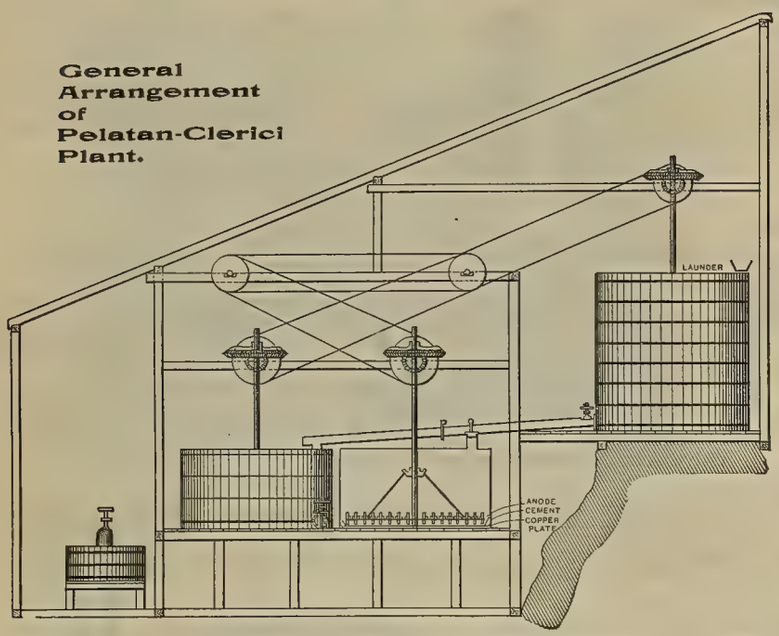
ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

THE "PELATAN-CLERICI" PROCESS

OF TREATING REFRACTORY ORES

General Arrangement of Pelatan-Clerici Plant.



Saves the precious metals by the simplest, most economical and most efficient process known. No roasting or previous treatment, except ordinary crushing. Extraction complete in from 6 to 12 hours. Extracts equally well both fine refractory gold and coarse gold in the form of amalgam. Makes a greater saving of gold than any other process from raw material at less cost. The electric current and dissolving agent promptly dissolve the precious metals, both gold and silver. Samples of ore tested free of charge. Several mills saving over 90 per cent of values by bullion returns. Simplicity. Economy. Efficiency.

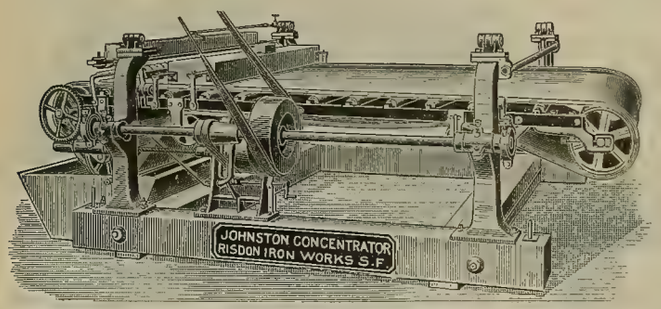
FOR PARTICULARS, WRITE TO

THE RISDON IRON WORKS,

SAN FRANCISCO, CAL.

AGENTS.

The JOHNSTON CONCENTRATOR.



DURABILITY, CAPACITY AND SIMPLICITY : : ARE ITS ESSENTIAL POINTS. : :

SAVES MORE VERY FINE SULPHURETS THAN ANY OTHER CONCENTRATOR MADE.

The Johnston Concentrator is slung with arms from above on an angle, giving it the oscillating motion that makes it a perfect machine. This undulating motion immediately settles the sulphurets, retaining all amalgam, leaving sulphurets very clean, one 6-ft. Johnston doing the work of two 4-ft. belt machines.

Send for Catalog No. 14.

Risdon Iron Works,

HOWARD AND BEALE STS., SAN FRANCISCO, CAL., U. S. A.



THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.



EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.
Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

THE BARTLETT CONCENTRATING TABLE.

One of these Machines will take the place of TWO or THREE Belt Concentrators of any make and do as good work.

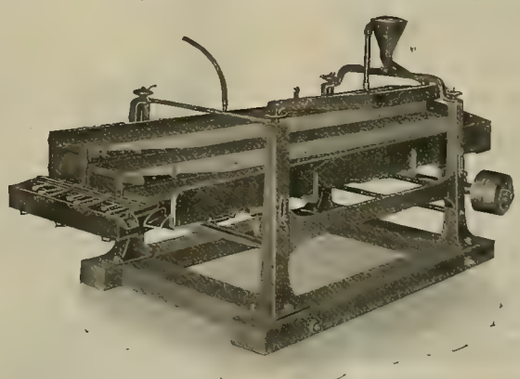
Separates ALL the minerals from each other at one operation.
Gives THREE CONCENTRATES on the one Machine at the same operation.
The Machine is especially adapted to the separation of Zinc and Lead.

- PRICE : -

12-ft. Table, $400.

SHIPPING WEIGHT - - - - - 2200 POUNDS.

CAPACITY - - - 10 to 30 tons per 24 hours.



Parties desiring tests made can send 500 lbs. or more, charges prepaid, and a run will be made and reports forwarded of the results, free of all charges, except for the assays, which will not exceed $10.00.

CAN BE SET UP ANYWHERE.

REQUIRES NO SPECIAL FOUNDATION.

Licensee for the Manufacture and Sale, **PARKE & LACY CO.,** 21 & 23 FREMONT STREET, San Francisco, Cal.

SOLE AGENT FOR

INGERSOLL-SERGEANT ROCK DRILLS and AIR COMPRESSORS.
KNOWLES PUMPS and PULSOMETER PUMPS, BULLOCK DIAMOND DRILLS.

CATALOGUES FREE ON APPLICATION.

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2080.—VOLUME LXXX. Number 22. SAN FRANCISCO, SATURDAY, JUNE 2, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Telluride, Colorado, District.

The Telluride mining district, in the San Juan mountains, southwest Colorado, is a mountainous region characterized by precipitous topography. The mountains rise to 14,000 feet from a plateau of 7000 feet, which bounds the region on the west. The rocks are nearly flat-bedded sedimentaries of Triassic, Jurassic and Cretaceous age, overlain in the eastern part of the quadrangle unconformably by a heavily bedded conglomerate, 200 feet thick, above which lie 2000 feet of andesitic breccias, in part waterlaid, and still higher 1000 feet of volcanic flows, andesite and rhyolite. Diorite stocks of large dimensions have cut all the other rocks of the region and are most recent in age. Surface denudation has exposed them to view. The centers of volcanic activity lie to the east of the sheet. Several well-defined fissure systems, due to the action of extraneous forces, penetrate the rocks of the region. The rocks are characterized by the alternation of widely and narrowly spaced zones of fissures. The zones of narrowly spaced fissures vary from 1 to 10 feet in width, and it is along these that the workable veins are found. Relative movement of the walls of the closely fissured zones, accompanied by trituration of the included rock, developed open space which the ore now occupies. The veins carry gold, mostly free, but in part combined with metallic sulphides, silver mostly in galena and freibergite, less frequently as stephanite, pyrargyrite, polybasite, etc. Beside iron, lead, copper and zinc sulphides, there occur as gangue, predominating quartz, carbonates, barite, fluorite, sericite and other minerals in small amount. Gold and silver veins occur closely associated. Accompanying the veins the wall rocks are altered, and impregnated with iron pyrite, occasionally auriferous. The values vary between wide limits. They must be given in more detail than is possible here. The veins show remarkable continuity in length, one having been profitably worked for a distance of more than two miles. The ore is of Tertiary age, is of deep-seated origin, and has been deposited from solutions; $20,000,000 is a low estimate for the product of the district. It has steadily increased in importance since 1875, and very rapidly within the last few years. Formerly silver was the principal product; now much the larger output is in gold. The three accompanying cuts from the Telluride Journal are typical of the topography of the district. The Bessie cyanide mill in Turkey creek, or Alta basin, is connected with the Bessie mine by an aerial ropeway. It is over 300 feet in length, 60 feet wide, and has a daily capacity of 200 tons. Near it is the 40-stamp mill of the Gold King, one of the steady producing concerns that pays its owners dividends and adds its annual mite to swell the great aggregate gold yield of the State. On page 612 is portrayed the Klondike mine, at Ophir, on the opposite slope of Silver mountain.



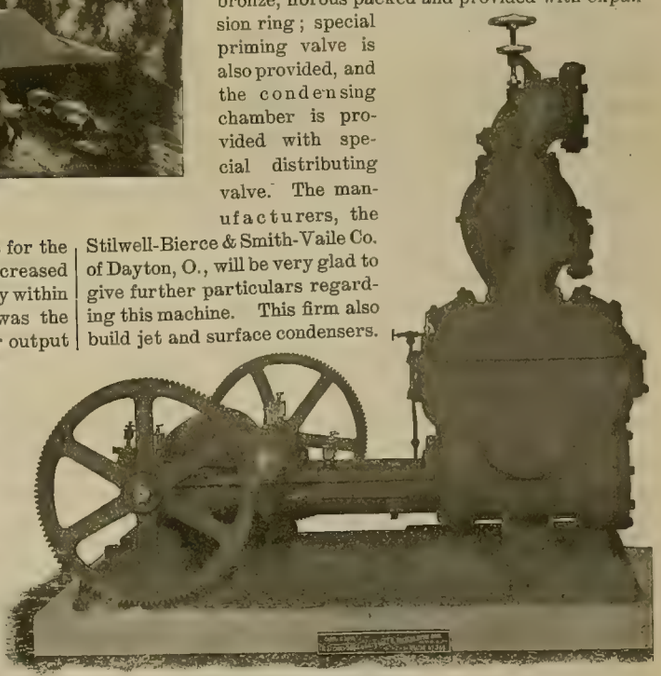
Gold King Stamp Mill, Near the Bessie, Telluride, Colo.



The Bessie Cyanide Mill, Telluride, Colo.

Direct Connected Jet Condenser.

There was lately installed at the U. S. Gov't. Yard, Bremerton, Washington, an electric plant, one of the units of the plant being a special Smith-Vaile direct connected, electrically operated jet condenser, as illustrated by half-tone herewith. A sub-base is provided extending under the air cylinder as well as condensing chamber, and also extended to receive a G. E. motor. The power end is provided with double reduction of gears; the motor is provided with rawhide pinion, and there is also a rawhide pinion on pinion shaft of condenser. The gears are machine cut; air cylinders removable and brass lined; air piston is of bronze, fibrous packed and provided with expansion ring; special priming valve is also provided, and the condensing chamber is provided with special distributing valve. The manufacturers, the Stilwell-Bierce & Smith-Vaile Co. of Dayton, O., will be very glad to give further particulars regarding this machine. This firm also build jet and surface condensers.



Direct Connected Jet Condenser.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN.....Publisher.

Special Representatives:

EASTERN.
E. H. HAVEN.....150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING.....153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT.....43-44 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS.....223 W. Second St., Los Angeles, Cal.

San Francisco, June 2, 1900.

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About Advertising.

Inquiry from the business office elicits the information that the number of the last advertising contract made with this paper, on the completion last week of its 40th year of publication, was No. 17,846, by the Geo. E. Dow Pumping Engine Co., of San Francisco, to expire June 1, 1901. To make and satisfactorily fill so many thousands of advertising contracts implies a little knowledge of advertising, and a few remarks on that subject are in order.

Vast amounts of money are annually paid publishers by dealers in and makers of machinery; some of the many who pay out money for space in public journals do not make proper use of their opportunities. To buy a certain amount of space is not enough. Advertising is costly; rightly used it is a profitable investment for the advertiser; wrongly used it is a great expense. The form and style of the advertisement should be occasionally changed; that gives a freshness and added value to the announcement. In such a paper as this, with a circulation all over the west half of America, weekly scanned by so many thousands of men in the mining industry, the advertising pages are read with as much care and scrutiny as any other part of the paper. Those pages constitute a directory of the leaders in every line of business connected with mining and metallurgy, and the announcements therein require change to be of fullest value to the men who pay for them, and, incidentally, to the paper, for if an advertisement does not pay it is not renewed, nor the contract continued, and however much the paper may try to secure and hold deserved popularity and thus make its advertising columns of value, its best efforts in this regard are not fairly supplemented by an advertiser who lets his advertisement appear week after week in the same old stereotyped form without changing it.

Advertising is essentially a co-operative matter. When a reputable paper contracts for a certain amount to publish an advertisement for a certain time, it tacitly agrees to vigilantly maintain and extend its circulation, to use all means to make the paper worth advertising in, and to thus serve the advertiser in his business. This the advertiser has a right to expect. For this he pays his money, and a paper that is sleepy or indifferent to his interests is just the same as any other employe in his business, deserving of dismissal. But on his part the paying of money for such active service is not enough: he owes a duty to himself to see that the advertising space is made pay, and, indirectly, a duty to the paper to aid it in its efforts in the same direction. This he can aid and co-operate in by such suggested changes. It is the policy of a live paper to make no charge for such changes, desiring to aid in making the advertisement of the fullest possible value.

One-time insertions seldom pay. The publisher knows this as well as does the advertiser who has learned it by sad experience. He should impress this fact on the advertisers from whom he takes business, though there are few periodicals strong enough to resist the temptation to take everything offered them without regard to the advertiser's best interests. The advertiser who has tested it knows that it usually takes several insertions of an advertisement to arouse the interest of the readers of a periodical. It is continuous advertising that pays. It takes time to form the acquaintance of readers. No prospective buyer is going to jump at a new proposition. He wants to know further, to see the announcement steadily and make inquiry before he parts with his money. Nor does it pay to just put in an advertisement and expect it to do all the work. Some months ago an advertiser wrote saying, "I do not think my advertisement pays. True, I get lots of inquiries, but I don't seem to increase my sales." If the advertisement elicited "lots of inquiries," it fulfilled its mission. That was what the advertisement was for; if he was too careless or unbusinesslike to follow up those inquiries, that was not the paper's fault. It brought him the inquiries; it was for him to do the rest.

Much money is fooled away in supposed advertising: "souvenirs," "special editions," "programmes,"—personal publications started to gratify personal ambition—are among the things in which advertisers yearly waste considerable money. Sympathy, inability to say "No," personal friendship, a desire to "see his name in print," or to "help the fellow along," sometimes influence a man to pay out good money, but he should charge that to charity, and not to his advertising account. As a business proposition, the only thing for makers and sellers of mechanical devices to advertise in is a high-class journal with good circulation among those from whom one has a right to expect customers. This is now well understood east of the Rockies. East of Denver a manufacturer or dealer would now laugh at any one soliciting an advertisement for anything but an established journal of wide circulation. It takes effort, unwearied vigilance and the expenditure of a great deal of money to build up a circulation that justifies a journal in taking money for announcements in its advertising columns, and even in this regard the fact that a publication was a good medium last year, or the year before, does not indicate that it is a good medium to-day. In the advertising field, as in all other fields, conditions are constantly changing. It is because advertisers do not generally recognize this fact that publications which were excellent media in the past, but are far from being so at present, find themselves able to secure an amount of advertising patronage out of all proportion to the value they give in return.

To those who understand these things advertising has ceased to be an experiment, or "an expense," and is assuming the exactitude and certainty of a science, with as tangible and definite a result as a mathematical calculation. Anything that sells goods is good advertising; it is not what it costs, but what it produces, that determines the value of an advertisement. If a $5 advertisement produces no result, it is $5 thrown away, no matter if it bought a page of space for a year; if a $500 advertisement sells $20,000 worth, it is a good advertisement. Advertising is simply the art of securing public notice, procuring prominence, obtaining attention of buyers. There are men in business who won't advertise; think it unnecessary; they have a right to such belief and are to be respected. That they are mistaken bears harder on themselves than on any one else. There are men who want to advertise, but don't know how; they are the prey of the man who proffers "cheap" advertising; who has only one price, and that is whatever he is offered. Some of those advertisers outgrow such folly and put the same business principles into practice in buying their advertising that they do in buying anything else, realizing that a good article always costs more than its inferior competitor, and is worth infinitely more.

There is a good deal in the wording and arrangement of the advertisement. The space costs just as much, no matter how it is filled, and, to get the full value out of it, what is said and how it is placed ought to have more attention than it ordinarily gets from advertisers in trade papers or technical journals. A picture of the machine or device for sale, with a brief reference thereto is always a good advertisement. What is fast becoming a favorite method with live advertisers is to have "a series": from six to twenty different advertisements, to rotate.

Some advertisers make the mistake of trying to put three gallons of syrup into a two-gallon jug. If they have six inches space they furnish material enough to require eight inches for proper display. How to attract requisite attention is the problem, and usually best solved by using some striking features, one of the best of which is bold type, attracting public notice, displayed in sufficient space to compel the attention of the reader.

A good way in preparing an advertisement is to look at the whole matter from the standpoint of the buyer. The man who makes or sells the machine knows so much about it that he often forgets that the man to whom he wants to sell doesn't know one-tenth as much about its details, and in making up his advertisement he ignores this fact and omits the very points that would be of interest to a probable customer. He can supplement this by the production of a good catalogue, which is an admirable adjunct to a good advertisement in the right kind of a paper, but a little information in the advertisement itself is always well.

It is never good business to exaggerate. The simplicity of truthfulness is best. The statement of the exact fact in a business announcement is of more mutual satisfaction. There is tremendous competition. About everything that is made must have something to recommend it above competing articles of the same kind; it must have some improvement, or be stronger or faster or do its work better, or cost less money, or something. Otherwise, it has no excuse for living. It is that way with a technical paper or a rock drill, an ore concentrator, a book, or anything else that depends on quality for its support. The way to sell the article is to tell what it is, what it does, and say briefly, clearly, convincingly why it should be bought in preference to anything else. Simply to say that the machine is the best is no use: any one can say that. It has been said over and over again. The assertion is a good one if it can be backed up—if it can be shown why. Of course, reputation goes a long way. There are men and firms advertising in this paper who have deserved reputations of long standing for making good goods at fair prices. They have enviable records and justly point to pleased customers all over, and are able to print good testimonials from satisfied patrons, which is always a good way of advertising. But it is a mistake to depend entirely upon long-established reputation or unblemished record of fair dealing. For instance, were this paper to depend in its business on its present lists of subscribers for a few years it would ultimately find its number of readers diminishing, for men die, or forget, or take up other publications. It is only by paying competent men to go all over California, Oregon, Idaho, Montana, Utah, Colorado and Arizona, and get subscribers, and by furnishing a valuable paper, that its lists can be held up. In this and by advertising it gets new subscribers—it advertises, too. Last year this paper sent out 224 different advertisements to as many different publications. We take our own medicine and practice what we preach. No institution, no matter how well known or well liked, can get along without pushing its business and advertising. Every business must keep young, must hustle and push and be enthusiastic, or fall behind and die of dry rot. So those old, dignified concerns that "really don't need to advertise; we are so well known, you know," are mistaken. There are many competitors in every field of business, and these competitors are building up their business by advertising and hard work. They have good goods, too, and mean to make it known and pound the fact into the public attention. These youngsters take advantage of up-to-date

methods of publicity (of which advertising is the most important), and will in time get the business away from old-established concerns that think they do not need to advertise, but can keep on going because of former momentum.

The trade or technical journal is the best medium to use for mechanical advertising; an advertisment in a general newspaper is like a shotgun: it scatters. Not one in a thousand is likely to be a customer. An advertisement before the men most likely to be customers is a rifle ball.

The purpose of all advertising is to sell goods—not "to help the paper along," or because one's competitor advertises, or just to make a showing, but to secure new customers and retain old ones, and whenever an advertiser finds or thinks that his advertisement is not paying him, or is failing to bring satisfactory results, he should discontinue it and try something else. Advertising space costs too much to fool money away on unprofitable mediums.

There are men who have made advertising the study of their lives; they often profit from the costly experience of others, and yet there is no great mystery about it. It consists in having something worth advertising, and then using the right kind of a medium to insure the greatest possible amount of publicity at the least possible outlay. All the medium can do is to go to its subscribers and tell the advertiser's story. The more people that read it the more valuable it is, if they are the kind of people likely to be customers. If the advertiser wisely chooses his medium and rightly uses his space he should get good returns. In every advertisement there should be some inducement to get people to write to the advertiser; the main thing is to get into personal communication with people. When an answer is received it is not well to merely send a catalogue or some printed matter or just acknowledge the letter, and let it go at that. When a man is sufficiently interested to write he should be given respectful attention. He should be written to and followed up, and kept after long enough and hard enough to eventually sell him what he wants.

Everything about an advertisement needs to be studied. What is said, how it is said, and the way it appears, is important. Some advertisers thoroughly realize the value of individuality. In the past two years this paper has paid over $400 for the different kinds of special type demanded by one particular advertiser who wants his announcements set just so and in the special type that he thinks is the right kind for his display. This is simply instanced as an illustration of how particular some advertisers are and how a journal spends money to please a particular customer. Advertising is an art; like anything else, nowadays, it takes brains to make it pay; it is recognized as a necessity by the brightest business men everywhere. It is cumulative in its effects and values. Were a man to advertise for a short time and then withdraw his announcement, he would derive little value from it; upon its continuance depends much of its value to him. In an advertisement to appear for, say, a year, the last six months is usually worth five times as much to him as the first six months. This is what is meant by the "cumulative" value of an advertisement.

The whole thing is simply a question of pushing one's self to the front, or of being pushed to the rear. The world has advanced, and, if a man wants to be in business, he must advertise or expect to be relegated to the musty oblivion of things that were. Time was when no one advertised, so it was unnecessary for any one to do it; but in this sunset year of the nineteenth century every one who is not in business solely for his health has to keep up with the procession.

If any one, on reading the above, imagines that it is written as a plea or solicitation for advertising, the writer has failed to make his meaning plain. This paper annually rejects considerable proffered advertising, and never has any difficulty in keeping its columns full. What is here said is intended to serve as a few practical points on a subject of great interest to a great many, yet one on which little has been written. The fact recited at the beginning that the last advertising contract received by this paper, on the close of its fortieth year, was No. 17,846, led to a train of thought in which some of the other 17,845 figured, and the above is the result.

Concentrates.

THERE is no late issue of the mining laws of California of any practical worth.

THERE is excellent slate in El Dorado county, Cal., but the demand is exceedingly limited.

WHITE LEAD ought to be a good lubricant for a hot crank pin, mixed in the proportion of one part lead to nine parts valve oil.

A. E. OUTERBRIDGE is authority for the statement that the clay underlying the City of Philadelphia, Pa., contains 3 cents in gold in every cubic foot.

THERE is not now, there has not been, nor is there likely to be any "plague" in San Francisco, bubonic or otherwise, beyond the ever present plague of pestilent politics.

FUSED sulphate of ammonia or alkaline halids have little effect upon platinum, but a mixture of ammonium sulphate and bromide, or potassium bromide, corrodes the metal rapidly.

THE only quicksilver mines in Russia are at Nikitowka, Bachnut district, Ekaterinoslav. The average yield of the ore is about ¼ of 1%; about 300,000 kilograms are annually produced.

FIBROUS TALC is used by paper makers, its value depending upon its fibrous structure. It is likewise used in the manufacture of dynamite, as an absorbent and conveyor of the nitro-glycerine.

ENTROPY or heat weight is that property of a body which remains unchanged so long as no addition or subtraction of heat is made from without. It is a property of the heat in the body, or heat energy.

"CHEMICAL LEAD" is a soft, pure lead, free from any other metal, used mostly for lining acid tanks. "Chemically pure lead" is a laboratory product, occasionally used for assay purposes, but not in general use.

FRENCH and Belgian burr stones consist of small particles of silica mixed with calcareous material. They are hard and porous. The German burr is of basaltic lava and the American burr is a quartz conglomerate.

IODOFORM is an organic compound similar in constitution to chloroform, but containing iodine in place of chlorine, and on this account is a solid at normal temperature. It is susceptible of electrolytic production from alcohol.

AT the chlorination plant of the Utica mine, Cal., the iron sulphate is made on the premises from scrap iron, sulphuric acid and water. Each tub of ore leached takes fifteen pounds sulphuric acid. A drum of liquid chlorine should treat about fifty tons concentrates.

IN mining management, as in other things, the cheapest man is he who knows how to succeed, and the most costly man to the members of a co-operative enterprise is the man who fails, and this would still be true though not a cent were paid him for his services.

THERE is an inevitable and unavoidable loss of gold and zinc in smelting cyanide slimes, though where the latter are well oxidized and properly fluxed the loss of zinc is reduced to the minimum; for nearly all the zinc goes into the slag except what is reduced in the smelting which partly enters the bullion and partly escapes as fume.

PURE chromium and tungsten may be manufactured in commercial quantities. The method is to take a carbon pipe filled with the metallic oxide mixed with carbon, inclining it and subjecting it to an electric current; the metal contaminated with carbon readily flows off as a result of the reaction. The chromium carbides are purified by remelting with lime.

THE value of a mining property is too elusive a subject to be disposed of in a "Concentrate." Ore in sight, less cost of extraction, is one element of value; its prospective value—what may exist, but is not "in sight." Its prospective value can not be fairly judged or even favorably considered because of its proximity to some going mine. Indeed, the very fact of its contiguity to a big paying property may be an argument against the prospect having any value at all.

LABORATORY experiments or metallurgical processes on a small scale are of the utmost value in indicating possibilities of commercial practice on a large scale. While the workings of a large plant is often entirely different from that of a very small one, yet it is fair to infer that a successful test on a small scale is presumptive evidence of attendant success on a larger scale commensurate with the magnitude of the interests involved, if the same degree of accuracy throughout be attainable in the latter case.

THE only properties necessary in moulding sand are silica and alumina. The presence of lime, magnesia, metallic oxide, etc., are detrimental. It is practically impossible to get sand with just the proper amount of silica and alumina in combination. To remedy this trouble, the best way is to make the mixture oneself. To do this in a practical way, get pure silica, or nearly so as possible; (it can be had up to 95% pure) and mix with a strong sand containing at least 60% to 70% alumina. It is impossible to give the exact proportions it would require in each case owing to the variation in the sands that are found in different parts. Theoretically, the proper proportion of silica is 90% to 10% alumina, but these proportions are, in the every-day hurry and push of the modern foundry, very difficult to keep up, as the clay in the strong fine sand vitrifies and adheres to the castings each day, so that the proportions would be changed after each heat. From 33% to 40% of silica with such sand as specified gives the best results, making castings with a smooth surface and sharp lines, and also enabling the foundryman to largely dispense with the use of foundry facings.

THE Crecelius process of casting aluminum is in use in St. Louis, Mo. It consists in using an iron mould with ascensional feed. The melting point of aluminum is 1300°, before casting the moulds are heated to about 1500°. The mould has a gate at the top into which metal is poured, and which follows up the shrinkage of the casting. The mould and its contents are then placed in a cooling chamber, through which compressed air is driven, rapidly reducing the temperature. The advantage claimed, apart from the greater decorative effect, is that, with one-third the weight, they are equal in strength to brass. As compared with steel, weight for weight, they are stated to be 10% stronger.

WATER HAMMER in pipes is caused by the surging of the water in partially filled steam or water pipes. In steam or return pipes in heating apparatus, air or steam may be lodged in places along horizontal pipes, separating portions of water, which, by the natural condition of moving water, produces wave motion and impact upon the inner surface of the pipe. In water pipes the presence of air in horizontal pipes produces the same action as in heating pipes. The absence of air in the water pipes of a house near the faucets causes water ram by the sudden closing of a faucet, due to the arrest of the momentum in the long column of water in motion. The air chambers in plumbing work act as a cushion.

AS FAR as the granite has been penetrated downward, no other rock has been found yet to underlie, and, therefore, the granite is still considered to be of igneous origin. The greater portion of the earth's crust accessible to human observation consists of rocks deposited by the agency of water, and, for this reason, rocks are sometimes classed as stratified and unstratified. The igneous rocks all belong to the unstratified class, for the stratified rocks have been laid down by the agency of water, and they are all alike in character, that is, they all consist of sand or lime, or shale, deposited in layers or laminæ. In proof of this, if a stratum of sandstone be cut across the planes of its bedding, its laminæ or thin layers are distinctly seen, and when a stratum of limestone is seen resting on a stratum of sandstone, the correct idea of the application of the term can be realized, for the stratum of limestone is distinctly different from the stratum of sandstone.

WHERE in the use of the cyanide process the percentage of extraction falls from 80% to 35%, it is likely that such result is due to an accumulation of products of decomposition of sulphides and cyanide. With every new operation a fresh quantity of sulphide of potassium was formed, which, being a precipitant for silver and gold, gradually prevented their solution by cyanide. Soluble lead or zinc salts could be used in such instances to remove the sulphur from the working solutions by causing it to form as insoluble metallic sulphides. The effects of roasting sulphides are, first, an alteration of obnoxious compounds into indifferent ones; second, the removal of sulphur, by which the ore grains become porous, and with it the fine gold and silver particles become accessible to solvents; and, third, a certain amount of fritting of the fine ore grains which follows more rapid leaching afterward. Where the ore is not roasted "dead," the effects will necessarily be different. The last named point would be the same; but, instead of insoluble oxides, there would be a mixture of sulphates and oxides as well as undecomposed sulphides; consequently, also, a less porous product. If all sulphides could be transformed into sulphates at the same time, little could be said against adopting such a method preparatory to cyanidation.

IN estimating sulphur in pyrites, to obviate the inconvenience attending the presence of ferric salts in the solution from which sulphuric acid is to be precipitated by barium chloride, the ferric salt may be reduced to ferrous, and at the same time destroying traces of nitric acid by boiling the acid solution with a sufficiency of sodium hypophosphite. This method gives results about ½% higher than are obtained by precipitating in the presence of ferric chloride; besides the method occupies less time and a smaller quantity of solution is used. In carrying out the process, 1 grain of pyrites is weighed into a flask, 25 c. c. nitric acid added and allowed to stand for a quarter of an hour without external heat; then 1½ grains of potassium chlorate is dropped in and the assay warmed for a quarter of an hour, then boiled down to dryness on a hot plate, the flask being inclined to avoid loss by splutterings; 20 c. c. of hydrochloric acid are next added and half boiled off, 50 c. c. water added and the assay filtered from insoluble matter. The filtrate and washings are made up to about 200 c. c. and then 1½ grains of sodium hypophosphite added; the assay is heated to boiling when it quickly loses all yellow color. A slight excess of barium chloride solution is then added and the assay allowed to stand for three hours, when, if the supernatant liquor be clear it may be filtered. The liquor is decanted onto the filter, and 1 c. c. hydrochloric acid dropped on the precipitate in the flask, followed by 100 c. c. of boiling water. After five minutes this also is poured on the filter, and the washing continued as usual. The filtrate and washings amount to 400-500 c. c. Duplicate assays usually agree to less than 0.2 in about 50%. Blank assays show that 0.01 to 0.02 grain of barium sulphate is to be deducted on this account.

Horses and Breccia.

Written for the MINING AND SCIENTIFIC PRESS by J. P. WALLACE.

Large isolated masses of country rock when enclosed in a vein and wholly or partly surrounded by ore are called horses. Horses result in many cases from an irregular fracturing of the country along the line of fissuring, whereby large angular masses are torn from either wall. The walls in many fissures are often very irregular and cracked. Mineralized solutions at a later period find their way into these cracks and enlarge them by dissolving out certain rock constituents, and in their stead depositing metallic and earthy minerals called ores. As a result of this process of replacement, the barren rock mass is completely detached from its resting place, is included within the vein and becomes a horse. Sometimes instead of a single fissure there are two nearly parallel fissures formed within a few feet or yards of each other, and these continue for varying distances and then come together to form but one crevice; a large sheet or slab of country rock is thus enclosed by the fissures, and, when the latter are subsequently filled with ore, the slab becomes in mining parlance a horse. In other cases the fissure is split up for a short distance into several arms, and these surround different horses of ground. The presence of horses in a vein may occasionally be accounted for by loose boulders rolling into a fissure from the surface; but such occurrences are probably rare, because the great majority of vein crevices were originally narrow cracks, and not gapping fissures. Veins which have been much faulted commonly enclose horses. Horses are often met with at the junction of so-called "cross courses" or "crossings" with a true vein, the country at such intersections being usually much broken. Horses of country rock are not confined to fissure veins; they occur in gash veins, bedded veins and contact deposits. Ore deposits in limestone furnish many examples of horses surrounded by ore.

Horses differ much in size and shape; they may be several hundred or only a few feet in length and of almost any shape; the width may be sufficient to almost block up the vein, or it may split the vein into two or more branches, the latter surrounding the barren block and again uniting beyond it. Several horses but little removed from each other also produce irregularities in the ore body. A single horse is sometimes divided by numerous ore seams, which traverse it in many directions, and not unfrequently the whole body is transformed into a mass of ore.

The fact that a vein is horse-ridden does not militate against its true fissure character nor its ore-bearing qualities, but the presence of horses often adds to the expense of development and occasions great inconvenience. Many such veins are excellent ore producers, and, although often lacking the old orthodox requirements of a true fissure, namely, well defined, smooth, corrugated and slickensided cheeks, they are nevertheless true veins.

Breccia in veins is a cemented mass of numerous, small, angular rock fragments. Horses and breccia are to be distinguished; a horse is a single large body and breccia is an aggregation of many small fragments. Either may occur in a vein without the other or both may be associated in the same vein. Breccia occurs mostly in veins bounded by hard, brittle rocks which have been subjected to violent shocks or explosive forces. Fissures resulting from such forces generally have shattered and imperfect walls, with much loose material between them. Subsequent movements of one wall against the other crush this material into innumerable pieces, and these are gathered into expanded portions of the vein, commonly known as shoots, which extend downwards at varying angles to different depths. Although vein breccia may occur independent of displacements, its presence is generally indicative of movement; but the amount of brecciation is not always in proportion to the amount of movement. When the fragments are loosely adherent, having many open spaces between them, ample room is afforded for the entrance of hot mineral-bearing waters. These slowly percolate through the mass, and, by an interchange of elements between the waters and rock fragments, the latter becomes more or less mineralized and the open spaces filled with quartz and metallic minerals. All breccias are not ore bearing; when made up of unusually small pieces of ground-up material, the mass packs very closely and chokes the openings, so that no passages are left for the mineralized waters. Such places in a vein are consequently barren of ore. The same vein may yield in one shoot barren, and in another shoot productive breccias, while other brecciated veins may be wholly unmineralized. As a rule, brecciation is conducive to ore deposition. Veins of this character are of frequent occurrence, and are generally looked upon with favor. Veins which have once been filled, but not with breccia, are at a later period occasionally rent asunder and their contents reduced by fault movements to a brecciated condition. Breccia thus formed may be simple or complex, that is, made from a single gangue stone, such as quartz, or new and different material furnished by the last movement may be mingled with that already present.

Brecciated ore deposits occur sometimes in the form of isolated chimneys or upright zones of crushed country rock. Brecciation is made possible in such cases by the occurrence of a network of short, cross-fracture lines, limited in diameter anywhere from 10 to 50 or 100 feet, but extending vertically to considerable depth. Gouge matter and striations are present in some instances, and these suggest prior movements within the mass. Generally ore zones of this kind are directly or indirectly associated with an interrupted line of fissuring, which is often a narrow crack choked with finely ground material, and, therefore, practically closed. Only at the point of cross-fracturing could the mineralized solutions find a ready passage to the surface.

Horizontal or slightly inclined brecciated ore deposits occur also. In Eagle county, Colo., an iron-stained quartzite breccia occurs in a sharply defined contact between a lower bed of gray, soft quartzite and an upper bed of white, massive quartzite. Continuous shoots of high-grade gold ore are found at intervals in the brecciated zone.

Mining on the California Gold Belt.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS, Assistant State Examiner of Mines.

Owing to the extremely complicated structural geology of the California gold belt, positive assertions as to the relative age of the eruptive rocks which so commonly occur throughout its length are unsafe; but in a general way it may be safely stated that upon rocks of an uncertain but very great age, possibly Archæan, there was laid down in Palæozoic time a deep series of sediments, consisting of mud, sandstone, limestone, etc. It appears that there was then a period of volcanic activity, during which were accumulated a vast quantity of basic rocks, chiefly diorite, diabase and basic tuffs, breccias and conglomerates. Upon this in Jurassic age was spread a deposit of mud of variable thickness, in some sections reaching a depth of several hundred feet. These sediments have been subsequently uplifted, folded and crushed and the upturned edges eroded over a very wide area. The rocks of the Palæozoic age are found developed to a great extent in Calaveras county and have been named by the United States Geological Survey the Calaveras formation. The later deposits of Jurassic time, owing to their extent in Mariposa county, have been named the Mariposa beds. It is in more or less close association with these latter that the so-called Mother Lode of California occurs. To the eastward of these formations is found a broad expanse of intrusive rock, which, owing to its peculiar mineralogical character, has been properly named granodiorite. At numerous points along the contact of the grano-diorite with the formations heretofore mentioned appears abundant evidence that the granodiorite was intruded later than the greenstones and probably also later than the Mariposa beds. The Mariposa beds appear to usually occupy a position along the axis of a great synclinal fold. The Calaveras formation is found both to the eastward and the westward of the Mariposa beds.

The tremendous compressive stress to which these rocks have been subjected since their uplift has resulted in the formation of a series of highly crystalline metamorphic rocks, the mud being altered into slates, the sandstone changed into quartzite, and frequently the limestones are found altered to marble. The greenstones have likewise been changed over broad areas to a schistose or slaty rock known as amphibolite schist. The pressure and movement accompanying it has resulted in many cases in a complete obliteration of the character of the normal rocks, and in place of the highly crystalline granular greenstones we find schists and slates. Throughout the entire gold belt are found greenstones of greatly varying texture—chiefly diabase—which have suffered little or no alteration. These masses of greenstone are from a few feet to several thousand feet in width, and it seems not improbable that they have been intruded since the folding of the sedimentary beds and the formation of the amphibolite schists.

In some of the mine workings of the gold belt these dyke rocks may be clearly seen to be more recent than the inclosing rocks, and not infrequently they are later than the formation of the quartz veins.

Throughout the entire length of the axis of this great synclinal trough is found the gold-bearing veins which constitute the so-called Mother Lode. It seems unfortunate that the name was ever given to this portion of the gold belt, as it conveys an impression to the minds of those unacquainted with the geological structure and veins of the region—that of a continuous, unbroken vein. That such a condition does not exist is well known to those familiar with these mines. There are, through that portion of the State occupied by the counties extending from Mariposa on the south to the southern portion of El Dorado county on the north, at least four distinctly recognizable gold belts. That which skirts the low foothills along the great central valley includes the copper mines found near Copperopolis and Campo Seco, in Calaveras county, and those in Amador county, and also the gold mines of Salt Spring valley, in Calaveras county. This belt may also be considered as embracing the gold mines near Hornitos, Mariposa county, and the copper mines farther south in Mariposa and Madera counties. This might be properly called the west lode.

East of this, a distance of about eight to ten miles, is found the most important gold-bearing belt of the State, which has unfortunately received the name of the Mother Lode. This, it seems to me, it would be well to designate as the Central Lode of the gold belt. It must be understood and remembered that the lode is nowhere continuous for a very great distance, but is frequently interrupted by its complete disappearance for considerable distances. Lying eastward of this, in Mariposa county, a distance of nearly twenty miles, and extending in a northwesterly direction through Tuolumne and Calaveras counties, is the third gold belt, which, in Amador county, has approached to within six or seven miles of the central belt. This is known as the East Lode, and embraces many important mines. Still farther eastward lies at least one mineral belt which has been opened at a few points, but of which comparatively little is known. This lode might be called the Sierra belt or lode.

It is with the Central gold belt, however, that we have chiefly to deal. For years, in fact since its early history, the Mariposa beds (clay slates) have been considered an absolutely essential feature of the important gold mines of this belt. The veins have been referred to as "contact veins," and in many sections the immediate contact or close proximity of the clay slates of the Mariposa beds has been deemed indispensable to pay rock. Such, however, is apparently not the case. Among the deepest and most extensive mines of this belt are those of Amador county, and while it is possible that some of these mines are confined wholly to the Mariposa beds or occur at contact with the Mariposa slates or greenstone, if such exist they are unknown to the writer, for, without exception, the large number of accessible mines prove that the Mariposa clay slates form really no important figure as related to ore deposition. The fissures in which these ore deposits occur with no exception, so far as the writer is aware, cut the dip of the inclosing rocks. The dip of the slates and schists is to the eastward, usually at an angle varying from 50% to 80%, while the dip of the vein, universally somewhat less, is approximately in the same direction. In many instances the fissures have been observed to cut the inclosing formations in both strike and dip.

In the mines of Amador county are found a black slaty rock often approaching in physical appearance the clay slates of the Mariposa beds, but that these black slates found in close association with the ore deposits of this county are not clay slates, but that they are the result of an extreme alteration of the greenstone tuffs, there can no longer be any doubt. In every mine accessible to the writer, from the Pocahontas, near Drytown, on the north, to the Argonaut, near Jackson, on the south, these black slates were found associated with the ore deposits, and in many instances great care was taken to investigate carefully their relation to the greenstones and clay slates and in each case a complete but gradual transition from the normal rock to a black rock with perfect slaty cleavage could be traced. The dumps of the Plymouth Consolidated mines are largely made up of these greenstone black slates, and it is probable they are not unlike the others. The Mariposa beds are frequently found in many of these mines in crosscuts which extend to the eastward or the westward of the main vein channels but rarely are they found in contact with the ore deposits themselves, and in no single instance within the limits described was an important ore body found associated with the Mariposa clay slates, nor are the ore bodies found for any considerable distance at contact with the Mariposa clay slates. In fact the fissures, where passing through the Mariposa clay slates, are usually destitute of value in Amador county. Where the Mariposa beds are exposed in various crosscuts it is sometimes impossible to find the line of demarkation between the metamorphic clay slates and the slaty rocks resulting from the alteration of the greenstone tuffs. On the other hand, there are numerous instances where the change is abrupt and sharply defined. It is interesting in this connection to know that in several shafts sunk near Jackson in the Mariposa clay slates no ore of value has been developed, though in two cases, at least, this development was very extensive.

This peculiar condition, however, appears to be local, as in Calaveras county the best portion of the Gwin mine is found in the clay slates of the Mariposa beds, and the Princeton vein is also wholly within these clay slates, none of the diabase tuff being observed in that locality. In Amador, however, it seems important to make the distinction in view of results thus far obtained.

A microscopic study of these rocks has been commenced by H. W. Fairbanks for the writer, and results thus far show that the peculiar appearing black slates found associated with the ore bodies of the large mines of Amador county are the result of the alteration of diabase tuffs. These tuffs are found intercalated with clay slates, which explains some of what would otherwise be peculiar geological occurrences. The liberal use of the microscope on the rocks of the California gold belt will throw much needed light on this subject.

(TO BE CONTINUED.)

The Cyanide Process at Mercur, Utah.

NUMBER II.—CONCLUDED.

THE ROASTERS.—As roasting furnaces for base ore, they have a capacity of seventy tons of roasted ore in twenty-four hours, this capacity, of course, varying somewhat with the varying character of the ore. In roasting base ore the furnaces are driven at about 40 feet per minute rabble speed, with a 4-inch bed of ore on the hearth. As calciners, they have about double the above-named capacity, which is obtained by speeding them up slightly and increasing the feed so as to run a much thicker bed of ore, usually about 6 inches. It requires a given particle of base ore about eight hours to pass through the furnaces, while the talcose ores, which only require heating to a dull-red heat, pass through in six hours. The Jackling furnaces have been found better adapted to roasting than the others, both in lower fuel consumption and greater capacity, and are used for that purpose. The other furnaces, which require an excessive amount of fuel to maintain them at high heats, are run at a low heat as calciners. About the same amount of fuel is required for the furnaces whether run as calciners or roasters, viz.: six and a half tons of slack coal per day. All the furnaces are run with a light forced draft, Sturtevant blowers being used for that purpose. After being roasted or calcined, as the case may be, the heated ore is elevated at the discharge end of the furnace to sheet iron floor above, and is conveyed by the rabbling mechanism in its return motion to the feed end of the furnace. During the six or eight hours required for its return trip it has become cooled, and is sprayed with water until slightly moist, for the double purpose of giving a more porous charge in the leaching tanks and avoiding dust in handling it to them. Just before reaching the feed end of the furnace again, the now roasted and cooled ore is discharged off the side of the furnace and automatically fed to the mixing and charging bin, from which it is drawn into cars for charging the leaching tanks. Four of the furnaces are in such a position that they discharge by gravity into this bin or pit, which is excavated in the middle furnace level, the ore being brought to it from the other furnaces by a system of belt conveyors. Into this pit is also drawn the oxidized ore from the finished ore bin, and it is essential that care be taken to get the most intimate mixture of all classes of ore before charging into the tanks, as otherwise greatly varying leaching rates will maintain, through the different characters of ore, crushed to different degrees of fineness in the same charge, and uniform leaching results be impossible.

The bottom of the charging pit is reached from the leaching section at the level of the top of leaching tanks by a short double-compartment tunnel. Here, for the first time since leaving the mine, the ore is handled manually, being drawn out of the charging bin into one-ton side-dumping basket cars, and dumped into the tanks from four tracks running longitudinally over the tops of them for the full length of the section.

The filters in the leaching tanks are of gravel, 4 inches deep. In constructing them a lattice work is made of 1x4-inch pine strips, set on edge longitudinally with the tanks, spaced 5-inch centers, and held in place by 4x1-inch block, placed 18 inches apart and nailed in, thus making a stiff framework, with compartments 4x18 inches and 4 inches deep. These are filled with two inches of gravel sized to about ¾ inch, 1 inch of gravel sized to about ½ inch, and 1 inch of coarse sand. Between each of these layers of filling is laid a strap of 12-ounce burlap, fitting the compartment neatly. On top of the finished gravel bed a covering of 12-ounce burlap is tacked, and over this a second covering of 16-ounce burlap. Iron strips are then fastened over the covering by nailing them through to each longitudinal strip of the frame. These strips are to protect the cloth in shoveling out tailings. This filter is very effectual, giving a perfectly clear solution under all circumstances. The top covering of 16-ounce burlap has to be renewed about once a year, and in two years it is necessary to renew both covers and replace the 1 inch of sand with fresh material, on account of its having collected enough fine slimes to become hard and slow of filtering. Two men on an eight-hour shift tram the pulp to a tank and fill it, and one additional man, half a shift, levels off the surface and prepares the charge for applying the first solution, and as this labor is paid $2.50 for eight hours work, it will be seen that the ore is charged into the vats for less than 2½ cents per ton. All tanks are connected bottom and top to one strong solution main, and at top only to weak solution and water mains. The first solution is applied to the ore from the charge under a 14-foot head from the standardizing tanks above. This solution contains from four-tenths to five-tenths of 1% potassium cyanide, or eight to ten pounds of the solid salt per ton of solution, and is allowed to saturate the charge slowly until solution begins to appear at the surface, which requires about eight hours, when it is shut off at the bottom and sufficient additional solution run on top to cover the charge about 2 inches. Thus it is allowed to stand for about sixteen hours, when the bottom outlet is opened and percolation started, strong solution being again run at the top. This is continued for twenty-four hours, and is followed by a weaker solution of strength $\frac{2}{10}$ to $\frac{3}{10}$ of 1% for from forty-eight to seventy-two hours, or until preliminary samples, which are taken every day, indicate that the charge is ready to wash and discharge. Washing and draining requires about twenty-four hours, making the total time from the application of the first solution to the discharge of the final wash five to six days, and from the time when the tank begins charging till it is again ready to be filled, six or seven days. All solutions, whether strong, weak or wash, coming from the leaching tanks run into a common launder direct to the gold solution storage tanks. Percolation is continued without interruption when once started. When a strong solution of $\frac{4}{10}$ of 1% is being used, these mixed solutions coming from the various leaching tanks, have a strength of $\frac{33}{100}$ to $\frac{35}{100}$ of 1%, and this solution, after being precipitated, is pumped back and used as weak solution without the addition of any fresh cyanide. The leaching rate varies greatly with the character of the ore in the charge, being most rapid with charges containing a large proportion of the coarsely crushed oxidized and calcined mixed ores. The practice is to allow ¾ to 1 inch depth of solution in the leaching tank to pass off each hour, but with charges containing a large proportion of base ore this rate is frequently not attainable, sometimes dropping as low as ¼ to ½ inch per hour, thus requiring that the charge be given longer time in order to get the necessary amount of solution through it, or that vacuum pumps be used, which is now sometimes done, although the standard practice is to leach by gravity only. The best results are attained when the solutions and wash passing through the charge is about two tons of solution to one ton of ore. A peculiar condition sometimes arises in tanks containing large proportions of roasted base ore, or all of this class, from the fact that the proportion of calcareous clays and siliceous limestones are right to make a pretty good cementing material when burned, and in such cases the charge sets and becomes very hard after about two days' contact with solution, rendering preliminary sampling with an auger very difficult and greatly impeding percolation. When the percentage of limestone is exceptionally high in the ore, and is pretty thoroughly burned to lime in the furnaces, its subsequent hydration on contact with the solution will even cause a tank charge of ore, all of this class, to swell perceptibly, and in such cases leaching becomes extremely slow and difficult. The consumption of cyanide in leaching is about nine-tenths of a pound per ton of ore, one-half of which amount is consumed from the first strong solution applied, and a considerable portion of the remainder is lost by imperfectly washing out the weak solutions. The actual consumption from the weak solution during its several days of contact is inconsiderable.

THE SOLUTION.—The standard strong solution is made by adding the necessary cyanide in lumps to the weak solution formerly described. Before bringing cyanide strength up to the standard, however, a sufficient quantity of caustic acid soda is added to bring the solution to a fixed standard of alkalinity, about a ton of caustic soda per ton of solution being used for this purpose. By this means a very great saving of cyanide is effected, amounting, as found by practice, to be about one pound of cyanide saved to every pound of caustic soda used. On account of absence of sufficient water to flush tailings out of tanks, these are discharged by shoveling through gates in the bottom into cars below, holding three and a half tons, and trammed out of the building by men. Each tank is provided with eight discharge gates, 15 inches in diameter, located above four longitudinal tracks running the full length of the building below the tanks. Discharging a tank takes five to seven hours, and costs 6 to 8 cents per ton, depending on the condition of the charge of tailings, i. e., whether they are more or less compact.

Precipitation of the gold from the solution is effected by means of zinc dust. The material used is the blue powder by-product obtained in zinc smelting. The dust used by the company is imported from England or Germany, and contains about 90% metallic zinc. The solution is pumped from the gold solution tanks to the precipitation tanks, of which there are three. Thirty tons of solution is a charge for precipitation in each tank. While the tank is filling, air at ten to fifteen pounds pressure is blown into the solution through a half-inch pipe, keeping it in a state of violent ebullition. This is done to stir up the precipitate that has settled to the bottom of the tank from former charges, and which contains a large amount of unconsumed zinc. Five pounds of fresh dust is used for every charge of thirty tons, this amount being sieved in, beginning when the tank is half full, and continuing the additions at intervals until the tank is full and the zinc has all been added. The air pipe is then moved about the bottom of the tank for a short time, to thoroughly stir up all sediment again, and then removed, and the suspended matter allowed to settle about half an hour, when the supernatant solution is drawn off through an opening in the side of the tank 8 inches above the bottom, and as it still contains considerable quantities of suspended gold slimes, it is passed through the filter presses to collect these, and runs from them direct to the barren solution sump. It is seldom necessary to use pressure to force the solution through the presses, other than the head of 18 feet between them and the bottom of the precipitation tanks, but sometimes this has to be done when the presses become well filled with slimes, and for this purpose two pressure tanks of thirty tons capacity each are suspended beneath the precipitation tanks, and connected with them by large pipes, so that a tank of solution can be discharged into them in a very few minutes, and thence forced through the presses, and when it becomes necessary, the solutions can be handled in this way as rapidly as when the presses are free to work by gravity. The filtering medium used in the presses is two layers of light canton flannel, between which is placed a sheet of heavy unsized paper. The precipitating and filtering operation is continuous, as while one tank is filling another is discharging and the third settling, and by this system as much as 2500 tons of solution has been precipitated in three tanks in twenty-four hours. The dust precipitation is almost instantaneous, being complete in a sample taken at once after the last zinc has been added. The precipitated solutions, after passing presses, rarely exceed 20 cents per ton in value and are usually lower. The consumption of zinc dust is about one and a third pounds per ounce of gold recovered.

MONTHLY CLEAN-UPS.—Clean-ups are made monthly, and require about three days, working on the day shift only. The precipitating tanks are allowed to drain, and the wet slime scooped into pans, after which the tank is washed out into the presses. At the same time the presses are opened and cleaned. The long time occupied in collecting the product is on account of having to clean one tank and three presses only at a time, so that the operation of the plant is only slightly inconvenienced. About half the total value is found in the presses, although the weight of product recovered from the tanks is three-quarters of the whole. The product is taken to a refinery in a separate building, and dried in shallow iron pans in a furnace having large cast-iron muffles, into which the pans are put. The cloths from the filter presses are also burned and the product brought to a dull heat, by which most of the remaining metallic zinc is oxidized. After cooling, it is pulverized through a ¼-inch screen and sampled. It usually contains from two and a half to three ounces of gold per pound of dried product. It is next treated in a lead-lined dissolving tank, with a mixture of dilute sulphuric and nitric acids, by which the remaining zinc and zinc oxide, arsenic and mercury are removed, as well as considerable quantities of lead coming from the zinc, and complex cyanides, lime, etc., from the solutions. The nitric acid is used to more effectually oxidize these substances, as well as to, in a great measure at least, prevent the evolution of the deadly arseniuretted hydrogen gas. The dissolving tank is covered with a closely fitting hood, which is connected to a large exhaust fan, taking the disagreeable and dangerous gases entirely outside the building and discharging them from a tall stack. The action of the acid is very violent, and it must be added in small quantities to avoid its boiling over the top of the tank. When the addition of fresh acid fails to cause further action, the tank is filled with water and allowed to settle. The supernatant liquor is then drawn off through a pressure tank and filter press, and the slimes again agitated with fresh water, this latter operation being repeated twice, to free them, as far as possible, from soluble salts. The slimes are then flushed into the pressure tank, filter-pressed into cakes, dried, coarsely pulverized, mixed with a flux of soda, potash and borax glass, and smelted in graphite crucibles in a double oil-burning furnace, capable of receiving two No. 300 crucibles at once. At this stage, before melting, the product contains 60% gold, the other 40% being largely siliceous slimes. The resulting bullion is 950 fine, and is cast into bars of 1000 ounces for shipment. This plant is the only one in the district refining its own product, all the other mills shipping to Eastern refineries. The total cost of refining is about 15 cents per ounce of gold.

Nothing has been said regarding the capacity of the mill, for the reason that this is a variable quantity, depending on the proportions of the various classes of ore being treated. The plant is designed to handle 1000 tons, run with seven furnaces on base ore and two on mixed, which gives 800 tons capacity of roasting and calcining ores, and supplied with 200 tons per day of oxidized and non-roasting ore. This capacity it handles with the utmost ease, the crushing equipment being equal to considerably more. If more calcining and oxidized ores are delivered to the mill, the capacity increases, by reason of more furnaces being used as calciners, and putting through double the tonnage they do when used as roasters. If the base ore delivered increases beyond the proportion stated, the capacity of the mill decreases correspondingly. The mill is designed to take the various ores in about the proportion they exist in the mine, but its operation is varied to suit conditions in the mine with regard to the most economical and complete extraction of the ore as it occurs, and the ore bodies are very spotted as regards the different classes of ore.

The Census Now Being Taken.

The count of the people in the United States began in all parts of the country June 1, and will end in the cities in two weeks and in the rest of the country before the close of the month. The people are to be counted at their places of residence; but, as many persons and families will be away from their homes during June, there is some danger that such persons will not be counted. If they are not counted, the locality in which they live will be misrepresented to that extent, and in some cases this misrepresentation may be enough to affect the representation in Congress of the State from which they come. Local pride and State pride, therefore, should influence all such absentees to take reasonable precautions against being omitted from enumeration in their places of residence. Such omissions are most likely to occur in the large cities where families close their homes and go elsewhere for the summer. The occurrence of the Paris Exposition this year is likely to increase the number absent from the country.

In all cases of contemplated absence, the head of the family is requested by the Census Office to communicate with the supervisor of the district in which he lives. He is also requested to leave information regarding his answers to the questions which are to be asked with some responsible neighbor who will agree to see that it reaches the enumerator on his rounds. Such information might better be left as a memorandum in writing, as in that case it is less likely to be overlooked. The questions to which answers are desired apply primarily to the population, but also to all mines and manufacturing establishments. They are being published from time to time in the press of the country.

By taking this trouble the absent citizen will do justice to his locality and his State and materially aid the Census Office in the performance of its duties.

The census schedule will include inquiries about the age, color or race, date of birth, conjugal condition, number of years married, place of birth, year of immigration to the United States, naturalization, occupation, number of months not employed, school attendance, and ability to read or write of all persons to whom these questions are applicable. In addition, inquiries will be made about the ownership of property.

CENSUS QUERIES.—The blank schedules to be used in the census have been distributed by the Census Office to the enumerators, who started to work yesterday. The schedules contain questions which some persons may think prying, purposeless or excessive in number. But their number and character have been determined by Congress, not by the Census Office, and all of them have been asked in previous censuses. The only important change since 1890 is that some questions have been abandoned.

People are often offended at the question, "How old are you?" and are apt to wonder what use the Government can make of their replies. Taken as a whole, the replies are as important as any class of information the Census Office collects. Age returns penetrate and elucidate every other branch of statistical knowledge. They show where child labor is prevalent, and where the proportion of persons able to support themselves is large or small. They reveal the great number of colored children and the short life of the negroes under present conditions. They make it possible to ascertain whether the average length of life is increasing or decreasing, how many men the nation contains who are capable of voting or of bearing arms, and whether the relative number of children is increasing or decreasing.

In Mohammedan or semi-civilized countries like India householders are often unwilling to answer the question regarding the sex of persons in the house, but in civilized countries where the sexes are regarded as on an equality, such unwillingness does not appear. The answers to the questions show that in nearly all cities the females outnumber the males, and that the same is true of most of the States along the Atlantic coast. The belief is widespread that, taking the world in general, there are more females alive at any given time than males, and that if it were not for immigration there would be more females in the United States than males. But census statistics show that we can not explain the great excess of males (over one and a half million) in the United States by immigration alone, for when the foreign-born are left out of account there are still above 600,000 more males than females.

Few would dispute the necessity for asking questions regarding race. All arguments regarding the future of any particular race in this country, like the Indian, the negro or the Chinaman, must hinge upon the returns in the census. With the Indians, moreover, it is of the highest importance to learn what success the policy of the Government has met with in establishing them apart from their tribes and reservations, and whether such Indians are increasing or decreasing.

Some mothers may shrink from stating the number of children they have had and the number who are living. But from the answers to these questions the country will learn whether the native American population is holding its own or whether, as some have claimed, it is being gradually supplanted and displaced by the children of recent immigrants.

In the light of such explanations, and only a few of the most important questions have been touched upon, it may perhaps be clear to the public that no question has been ordered by Congress, or has been asked by the Census Office, which, if properly and correctly answered, will not lead to suggestive inferences regarding the American people and their work.

Using the Exhaust.

Consul Mason reports from the technical school at Charlottenburg something of interest in steam engine economies. The process of G. Behrend, a Hamburg engineer, and Dr. Zimmerman of Ludwigshafen, is said to increase the power 50%. The increased power is derived from the exhaust steam of the engines, be it simple or compound. Instead of seeking to condense the exhaust steam and thereby lose its latent heat in the condensing water, the idea is to employ this waste steam to create a new supply of steam by evaporating some liquid which has a lower boiling point than water, and for this purpose sulphurous acid was chosen. This is comparatively cheap and easily obtained, and is a viscous liquid.

To test the efficiency of the scheme a compound engine of about 34 H. P. was fitted with an auxiliary engine employing vaporized sulphurous acid in its cylinder, and it is claimed this combination yielded 53 H. P. on the same steam consumption.

The test plant consisted of a two-cylinder compound engine, having cylinders 13.4 and 20.8 inches in diameter respectively, a stroke of 19.7 inches and a speed of 41.5 revolutions per minute. From the low pressure cylinder the steam passes into what is termed a vaporizer, or condenser. The cooling medium used instead of water is sulphurous acid, which has a boiling point so low that it is immediately decomposed by the heat of the exhaust steam, where sulphur dioxide gas is liberated, and passes over into the cylinder of the auxiliary engine, where work is done as in an ordinary steam engine. This auxiliary cylinder has a diameter of 11.81 inches and a stroke of 19.7 inches, with a speed of 77 revolutions per minute.

After passing through this cylinder the sulphurous vapor enters a surface condenser, around the tubes of which cold water flows as in an ordinray steam plant. Here the sulphurous vapor is condensed to liquid and is forced by a pump back into the vaporizer, where it begins its cycle again, the same sulphur dioxide gas being used over and over again indefinitely. There are, therefore, two condensers. The first serves as a boiler or steam generator for the auxilary engine, and this boiler, instead of being fired by coal, obtains all its heat from the exhaust of an ordinary steam engine. and instead of converting water into steam evaporates a liquid which is more volatile; that is, which has a lower boiling point.

With this outfit a long series of tests were made, of which the following is a statement of the results obtained:

The compound engine, as above, being given a steady load, developed 34 indicated H. P., with a steam consumption of 18.96 pounds of steam per indicated H. P. The auxiliary machine working with the sulphurous vapor indicated 19 H. P., that is, showing an increase of 56% and yielding, instead of 1 H. P., 1.5 P. H. for the same steam consumption, thereby reducing the steam consumption from 18.96 pounds per indicated H. P. to 12.13 pounds.

For the increased expense of the first cost of the vaporizer, condenser and auxiliary engine the available output of the engine is therefore, according to these experiments, increased 50% without adding a pound to the fuel consumption, except such as may be required for pumping the condensing water and forcing the sulphurous acid back into the vaporizer.

Yet the fact that the experiments as recorded were made at a technical school of high standing commands attention for what may be a step in an original direction in the perfection of steam engines in the matter of efficiency.

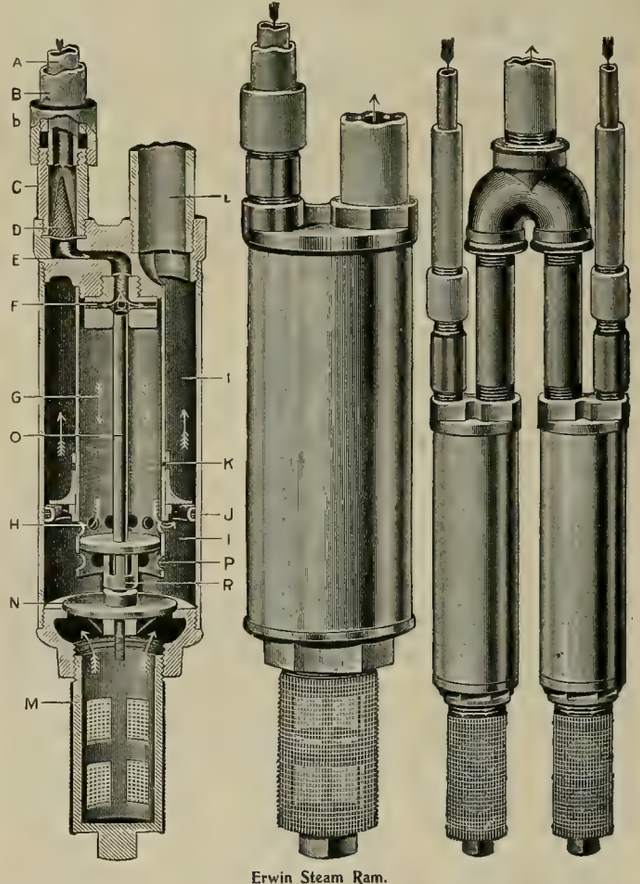
THE future steam engine, in the opinion of C. T. Porter, is to depend upon mechanical draft instead of chimney draft. At a late meeting of the American Society of Mechanical Engineers he stated that the new engineering has established that the boiler furnace shall be independent of natural draft, effectually consuming its smoke, and burning two or more times as much coal as it could do under natural draft alone, and yet sending off the gases at a low temperature; the boiler being a steam generator, a superheater and a fuel economizer combined.

The Erwin Steam Ram.

Herewith is illustrated, sectionally, the Erwin Steam Ram, patented by Jas. B. Erwin and William Kirkwood, and manufactured by the Penberthy Injector Co., Detroit, Mich.

When the ram is at work, water is elevated alternately by steam and atmospheric pressure. The steam, having driven the water from the ram, condenses, and a vacuum is formed; a volume of water is then driven into the ram by atmospheric pressure, filling the vacuum chamber, a large part passing on through the ram and into its discharge pipe, the steam and air thus coacting to make the discharge of water continuous.

The ram is put beneath the surface of the water, and, before starting, water flows into it by gravity. When the steam is turned on it passes through the steam pipe A, nipple C, conical screen D, the main steam port E and radial steam ports F into the cylinder G. The water is then forced downward through the openings H into the surrounding discharge chamber I, where it passes through the annular check valve J, and out of the discharge pipe L. When the steam reaches the lower end of the cylinder G, it is exhausted through the large openings H much faster than it is admitted through the steam ports F, is condensed in the surrounding discharge chamber I, and a partial vaccum is formed within the cylinder G. The vacuum is made more complete by a spray of water which then rushes inward from the discharge chamber I through the small opening K. When a vacuum is created and condensation occurs the pressure of the atmosphere on the water outside of the ram forces water upward through the bottom strainer M. The check valve N then rises and the valve rod O, which is rigidly attached to it, shuts off the steam at the upper end of the cylinder. A volume of water under atmospheric pressure is at the same time forced upward through the discharge chamber and out into the discharge pipe. A portion of this water, however, passes through the openings P, forces up the float R, which moves freely on the valve rod O and refills the cylinder. The water under atmospheric pressure having then lost in momentum, the steam, acting downward on the valve rod, closes the main check valve, and, through pressure exerted on the float, again forces water out of the cylinder and through the discharge chamber and discharge pipe. A covering pipe B surrounds the steam pipe for the distance it is submerged beneath water, to prevent condensation, and is received into the coupling b. By connecting the discharge pipes of two rams with a common discharge chamber a double ram can be formed, as illustrated.



Erwin Steam Ram.

Mining and Metallurgical Patents.

Patents Issued May 22, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

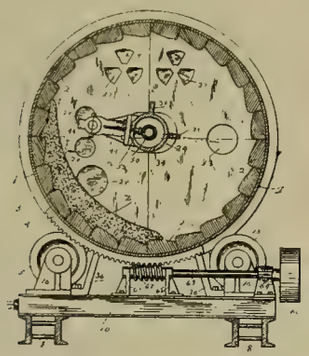
EXPLOSIVE COMPOUND.—No. 649,913; S. Clark, Gold Hill, Or.

Explosive compound formed by mixing nitrate of soda, sulphur, metallic antimony, carbonaceous matter, picric acid, nitric acid, rosin, water and a reducer.

METHOD OF EXTRACTING PRECIOUS METALS FROM ORES.—No. 649,962; E. A. Smith and M. H. Lyng, Anaconda, Mont.; assignors to the Illinois Reduction Co., Chicago, Ill.

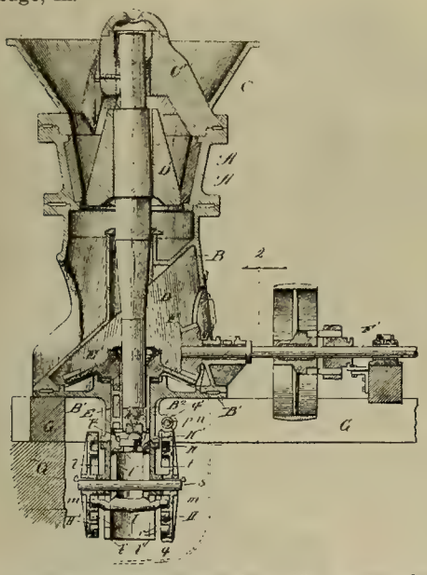
Suitably electrolyzing an alkali-metal-chloride solution to form in part oxychoride leaving sodium chloride in excess in resultant leach liquid, digesting pulverized ore in suspension with mixed chloride solution and free acid to release chlorine and effect solution of the gold, silver, (and copper, if present,) properly precipitating from separated solution and after removal of such precipitates, partially evaporating mixed chloride solution remaining so as to separately recover by fractional crystallization alkali-metal chloride present, digesting by means of suitable reagent (with aid of free steam if necessary) concentrated mixed chlorides left over as residue from such fractional crystallization, condensing vapors of hydrochloric acid thence evolved, separately dissolving recovered crystals of alkali-metal chloride, thereupon treating such solution electrolytically to regenerate same into state of oxychloride for reuse.

ORE ROASTING FURNACE.—No. 649,999; J. C. Teller, Minneapolis, Minn.



In an apparatus for the treatment of ores or similar material, combination with rotary drum, of gas supply pipe 34 and air supply pipe 56, former surrounding latter and extending through drum, one or more laterally projecting tuyeres consisting of outer section 44 opening from gas pipe 34 provided with elongated discharge opening 45, and inner steam sections 52 provided with elongated nozzle section 53, terminating within and located concentric opening 45.

CRUSHING MILL.—No. 650,097; M. J. E. Rotter, Chicago, Ill.

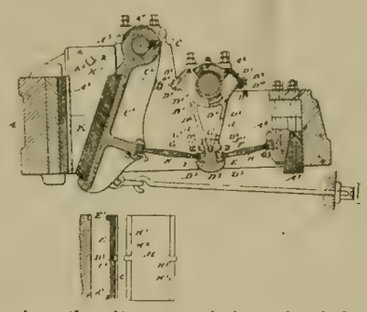


In crushing mill, combination with crusher head and its supporting spindle, of raising and lowering mechanism for head, comprising vertically sliding block upon which spindle is gyratively mounted at lower end, yoke supporting block, shaft, wheels rigid upon shaft provided with coincident spiral cams engaging yoke, worm teeth on wheel, worm engaging worm teeth, an operating handle for worm.

PROCESS OF EXTRACTING GOLD, SILVER OR OTHER METALS.—No. 650,019; J. C. Montgomerie, Stair, Scotland, and H. Parkes, London, England.

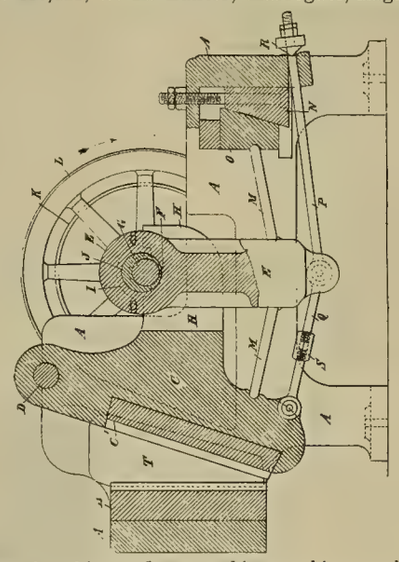
Calcining the ore until sulphides are converted into sulphates and oxides, subjecting calcined ore with compound composed of common salt, sulphuric acid yielding agent and an oxygen yielding substance to a red heat without admission of air, treating mass with water to remove soluble salts, subjecting residue to sulphuric acid, then washing the mass, subjecting residue to solution of hyposulphite of soda, finally subjecting residue to a gold solvent.

ROCK CRUSHER.—No. 650,105; E. C. Bacon, New York, N. Y.



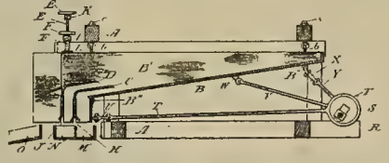
A crusher, the pitman consisting of tubular head D′ inclosing eccentric B′, converging webs D^2 extending tangentially from head and joined at lower end D^3, transverse webs D^4, toggle bearings E, flanges D^5 supporting latter, swells D^6 formed on pitman in proximity to flanges, wedges F F′, and bolts G extending through converging webs and wedges, inner nuts G′ on bolts and outer nuts G^2 thereon, all combined, and means for locking bearing to support.

OPERATING MECHANISM FOR STONE OR ORE CRUSHERS.—No. 650,121; W. H. Baxter, Harrogate, England.



Stone breaking and ore crushing machine, combination of movable jawstock, shaft on which movable jawstock is mounted, brackets at rear of and moving with jawstock, shaft carried in brackets, an eccentric mounted upon shaft, pitman mounted on eccentric, adjustable drawback rods attached together at one end at lower end of pitman and at other ends respectively to movable jawstock and framework of machine, toggle block at rear of machine, wedge at back of toggle block, toggles respectively interposed between movable jawstock, pitman, and toggle block, and flywheels and driving pulley mounted upon eccentric shaft.

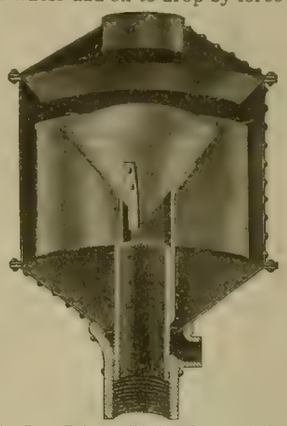
CONCENTRATOR.—No. 650,138; C. A. Smith, Los Angeles, Cal.



Concentrator comprising trough B gradually decreasing in width from head to tail, having sides B′ gradually increasing in width from head to tail; adjustable separating plate C for separating gangue from semi-concentrates; yoke Y attached to plate C having threaded socket for reception and working of screw F adapted to work in screw threaded in yoke I having hand wheel F′; yoke K attached to plate D; screw E rotatively attached to yoke K and adapted to work in screw threaded opening in screw F and having hand wheel E′; chutes M N and O for carrying away respectively the concentrates, semi-concentrates and gangue.

The Burt Exhaust Head.

The Burt Mfg. Co., Akron, O., makes and sells the exhaust head shown in the accompanying sectional illustration. It is of unusual form; has perpendicular sides to give it greater area inside, and more room for steam expansion for the prevention of back pressure. There is but one steam chamber, the entire head, attached to the exhaust pipe of the boiler system to prevent oil and watery steam from getting out. Only dry steam escapes. The exhaust steam, after coming through the pipe, strikes the cone immediately over the inlet. This cone separates the steam into the finest particles, condensing some of the vapor. The greater volume of steam rises up to the small projection extending around the top of the head, and is held there for an instant, causing the particles of water and oil to drop by force of gravity



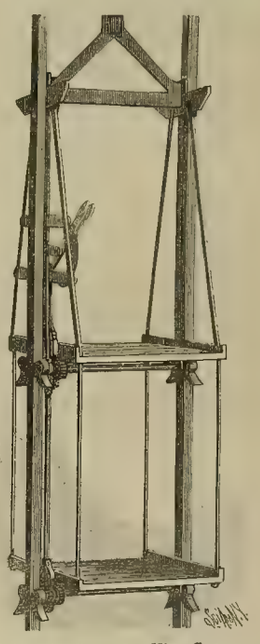
The Burt Exhaust Head — Sectional View.

down between the double walls on the side and out through the drip below. Joints, seams and attachments are water tight.

The Burt exhaust head is not an experiment, but has been tested by time and service. It is made of heavy iron, lapped, riveted and soldered, and covered with anti-rust paint. Further information can be procured of the manufacturers.

Safety Appliance for Mine Cages.

A device herewith illustrated, a patent for which is held by Cook & Wishon, of Butte, Montana, relates to stopping the movements of mine cages, being so constructed as to provide a means of holding the cage under the control of the cage tender, and may be adapted to cages having any number of decks. Mounted in the framing of the cage below the deck on platform are two shafts, to the ends of which are fixed dogs, which have toothed cam surfaces adapted



Safety Appliance for Mine Cages.

to bear against the guides of the shaft to grip them and stop the cage. To each shaft is fixed a pinion, which meshes with racks which extend vertically between the pinions and fastened to their upper ends to a link. By the movement of the links the pinions and shafts may be turned and the dogs thrown into and out of engagement with the guides. The upper end of the link is pivotally joined to a lever fulcrumed on a stud projecting from the framing of the cage. The invention has been applied in the Speculator mine, Butte, Montana.

Treatment of Copper Mattes in the Bessemer Converter.*

NUMBER IV.

THE CHARGE.—No one to-day is following the line of Holloway's procedure in endeavoring to smelt ore except as lining in the converter. The charge is invariably matte, but it varies widely in percentage. No matte can be too low in copper to absolutely prohibit its treatment by this method, the question of grade being merely a question of economy, and the item of cost involved being that of lining. The higher the matte be in iron, the more certain it is, therefore, to shorten the life of a lining. If, therefore, the lining be barren of valuable metals, the extra cost of the material, plus the cost of replacing it, involved in the treatment of lower instead of high grade matte, may be in excess of the cost of producing a higher grade of matte by some other method, or by changing the furnace mixture. If, on the other hand, the lining consist of gold, or silver, or copper ore, their rapid consumption as lining may prove to be the cheapest way of smelting them. No rule, therefore, can be laid down as applicable to all conditions and circumstances. The usual practice to-day in Western works is to charge the converters with a matte of about 50%. But at Aguas Calientes, where the Messrs. Guggenheim line their large converters with silver ores, it is found profitable to use matte of a lower grade. The quantity of copper a stand of converters will turn out is, of course, regulated by the grade of the matte, and therefore a larger plant is required to turn out a given amount of copper when running on a low, in preference to a higher, grade matte. The item of interest on plant is therefore affected.

The methods of conveying the mattes from the smelting furnaces to the converters has already been referred to. The converter, when being filled, is tilted sufficiently to prevent the matte entering the tuyeres, and the blast is turned on before the converter is restored to its vertical position.

The series of operations in actual practice consist of the first blow lasting about twenty minutes, during which the iron is oxidized and converted into slag, at the expense of the lining, and not quite one-half of the sulphur volatilized or oxidized. The converter is then turned and the blast thrown off. The product is white metal and slag, most of which is poured, the last of it being removed by a rabble. If the matte has been poor, or the converter capacity much increased by corrosion of the lining, a second charge of matte is added to the white metal, and the first blow is repeated. The converter is turned again, and the slag repoured and reskimmed. The second blow lasts somewhat longer than the first, and results in copper of about 99%, and a small quantity of slag, part of which remains in the converter in loose granular condition, and can be emptied by merely reversing the converters. The copper is usually poured into deep moulds mounted on a long carriage, which is wheeled back and forward beneath the converter. The moulds are made, as previously stated, usually of cast iron or steel, though in some works of coarse converter copper. In a few cases, as in the Heinze works, already described, where the gold and silver contents is high, it is poured into shallow moulds, and cast into thin plates for greater certainty in sampling. Anodes are sometimes cast direct from the converter into open moulds. They are, however, rough, and being of equal density make an inordinate amount of scrap in the electrolytic vats, and are very liable to occasion short circuiting. I have made smooth anodes in closed vertical moulds, bolted together with clamps like brass bar moulds. But it requires consummate skill to stop the blow just at the moment when the copper after pouring will not boil. As a rule, it is better to expose the copper, as at Anaconda, to partial refining before casting into anodes.

The duration of the blow is determined by the color of the escaping gases, the peculiar noise made by the escaping blast, and the appearance of the particles of solid matter ejected. During the first blow the flame is green turning to blue. During the final blow an orange flame predominates. The air guage as well as the escaping gases indicates the condition of the tuyeres. If the converter is hot and working well, little or no punching will be required during the first blow. It is after metallic copper forms that punching has to be freely resorted to, though in the trough converters, which can be revolved as reduction progresses, so that the blast shall impinge on the unreduced matte instead of being forced through reduced copper, less punching is needed than in the upright converter. In all well-designed copper converting shells the wind box gates are provided with automatic shutters or valves, which allow the bar to be inserted and withdrawn with the least possible labor, loss of time, and waste of blast. When the slag is forming rapidly at the commencement of the first blow, if the blast be excessive, slag and matte are thrown sometimes with explosive violence from the converter, and the same accident is liable to happen at the end of the first blow if carried too far. These phenomena are due probably to both mechanical and chemical causes. The dense impermeable slag is raised in masses by an accumulated superheated blast, and, as suggested by Hixon, if the charge be overblown while slag is unremoved, large volumes of SO_2 are liable to be generated by the action of cupric oxide on the white metal (the reaction taken advantage of by James and Nicholls in their beautiful direct method, $Cu_2S + 2CuO = 4Cu + SO_2$), and the escaping SO_2 causes the slag to boil and carry the slag with it out of the converter.

At no works in the United States are as large converters used as at Aguas Calientes in Mexico. There several tappings of matte must be successively blown to white metal before a charge sufficient in quantity is secured. Hixon, who was superintendent at these works, thus describes a run: "At Aguas Calientes the converter was 8 feet in diameter the largest copper converter in the world, and on low grade matte a charge of 8000 pounds for the first tap would be taken and blown to white metal; the slag poured off and a second tap of 10,000 pounds poured in, and blown to slag and skimmed in the same way. A third, and sometimes a fourth, tap would be skimmed before the resulting white metal would be sufficient to stand above the tuyeres till the charge was finished. In this way charges of 45,000 pounds of matte were not uncommon, and the resulting copper would not be more than forty bars of 200 pounds each. With matte as low as 30% the converter increased in size so rapidly, owing to the corrosion of the lining, that it was difficult to get a charge to finish. After the vessel had finished the last charge that the lining would stand, a tap of from 10,000 to 15,000 pounds of matte would be put in and blown to slag or until it was in danger of coming through the side or bottom. This was for the purpose of washing out the copper adhering to the lining after the last charge. The resulting white metal was dumped and used as scrap on subsequent charges."

But with converters of average size, operations illustrate more accurately an actual run. The matte treatment was tapped directly from the well of the furnace into the converter, and therefore no weights were taken. The converters were of the trough pattern, actual measurement of shell 96 inches by 50 inches by 48 inches deep.

Nine hours forty-three minutes were consumed in making 15,070 pounds of copper in four charges, or two hours twenty-five minutes per charge. To this twenty minutes must be added for time allowed for changing converter shells. Of this time first charge was blown up to copper in one hour eleven minutes; second charge, one hour thirty-five minutes; third charge, one hour thirty-seven minutes; fourth charge, fifty-seven minutes; total, five hours twenty minutes.

The skimming and second matte filling of first charge occupied actually thirty-four minutes; second charge, thirty-seven minutes; third charge, thirty-nine minutes; skimming of fourth charge, sixteen minutes; total, two hours six minutes.

The difference of two hours seventeen minutes, or thirty-four and one-quarter minutes per charge, were therefore spent in pouring copper, patching and charging, an excessive allowance, due in part to the system otherwise so economical of linking a furnace to one converter as previously explained. The time lost in charging shells can be saved, and the maximum amount of copper per converter in blast can be made only when a fresh converter stands charged and ready to receive the blast immediately it is turned off from a finished charge. Four stands to three active converters should be provided.

The analysis shows that iron is virtually oxidized and eliminated by the first blow, but that about 0.15% clings tenaciously to the copper. Approximately one-half the sulphur is dissipated in vapor and gas during the first blow. The fresh matte contained Cu and S in the proportion of 2.5 to 1, whereas the white metal contained about 3.7 of Cu to 1 of S. Nickel is more rapidly oxidized in the converter than in the reverberatory or cupola; the same is true, as might be expected, of the more volatile metals and metalloids.

As the weights of matte could not be taken, the loss of gold and silver can only be determined relatively to that of copper.

The silver in the matte amounted to 8.6 ounces to the ton of copper and the silver in the black copper amounted to 8.2 ounces to the ton of copper, showing a loss of 4.6%.

The gold in the matte amounted to 0.429 ounce per ton of copper, and in the black copper to 0.394 ounce per ton of Cu, or a loss of 0.035 equal to 8.2%.

The amount of gold was so extremely small that the assay results, carried to only two decimal points, are not sufficiently accurate for comparison. As in the above calculation the loss in silver is deducted from twelve matte assays as compared with only four metallic copper assays, the admitted losses made in the assaying of the silver should still further reduce the discrepancy. The above value in silver and gold represent about one ounce of silver and 60 cents worth of gold to the ton of ore; yet when concentrated in the copper bars, these minute quantities are profitably extracted.

The following analysis of matte treated and copper produced in Stalmann converter at the Mt. Lyell Company's works show a gain in both silver and gold.

The matte treated contained: copper, 53.15%; silver, 34.19 ounces per ton; gold, 2.178 ounces per ton.

The copper produced contained: copper, 98.74%; silver, 64.86 ounces per ton; gold, 4.287 ounces per ton.

Had the relations been maintained between copper, silver and gold, the Ag contents of the copper should have been only 63.3 ounces instead of 64.54 ounces, gold contents 4.03 ounces instead of 4.28 ounces.

For the David selecteur the claim is undoubtedly well founded that the first copper formed carries down the gold, the silver in larger proportion than the average of the charge, and some of the impurities, making what corresponds to impure auriferous bottoms and the best select of the Swansea reverberatory process.

Another subject of interest is the distribution of the precious metals and other impurities in the copper bars. Many anomalies seem to occur which have been discussed with a great wealth of illustrations and analysis by Edward Keller, of Baltimore, who had at his disposal for examination bars of blister made by reverbertory, converter bars, and bars of refined copper. He has supplied us with many curious facts and ingenious explanations. What is still lacking is a comparison of bars made from exactly the same ores, some by the pneumatic method, others in the cupola, and still others in the reverberatory. Not till then will the question of comparative purity and losses be settled beyond contradiction.

The following analyses made to determine primarily the movement of selenium and tellurium as the reduction of copper in the converter proceeds bear also on the concentration of the gold in the first copper reduced. Two bars poured from the converter five minutes after the commencement of the second blow contained: Cu 99.28%, Ag 16.864 ounces, Au 0.915 ounces, Se and Te 0.0156 %. The eleven bars made from the rest of the charge contained: Cu 99.40%, Ag. 11.373 ounces, Se and Te 0.0224%. It is worthy of note that the first copper formed was almost as pure as that finally tapped, and less selenium and tellurium entered the bottom than remained in the matte.

(TO BE CONTINUED.)

*Condensed from a paper read by JAMES DOUGLAS before the London Institution Mining and Metallurgy.



The Klondike Mine, Waterfall Gulch, Ophir, Colorado. (See page 605.)

The surroundings of the Klondike mine are of interest to geologists, the walls of the canyon, several hundred feet in height, appearing to be a mass of oxidized quartz in which verge veins carrying gold ore.

MINING SUMMARY.

ALASKA.

Cape Nome is the present Mecca of the miner. The historic rush to California in '49, the Fraser boom, the stampede to Pike's Peak, even the Klondicitis of '97, fail to fill the present proportions. From San Francisco and Seattle last month went many vessels carrying thousands of the best American miners, for in these adventures none but the daring start (and none but the strong survive). With them went the usual parasites and an unusual number of unskilled men and women, lawyers, broken down sports and restless people. Some of those going had as part of their outfit guns and legal attendants; others had powers of attorney and paper possession of sundry claims; others took suitable machinery, counting on that and personal efficiency to get a "lay" from some one up there possessed of a claim but lacking other essentials; others went because they had enough money to get there, and were taking chances; a few knew just what they were going to do and how they were going to do it. Meanwhile from the Yukon region, earlier, went more than enough to occupy all the available ground reported. Probably later arrivals will scatter out and find new territory; some of them invest, as they can not remain idle under such heavy expense as living at Cape Nome entails.

The most authentic accounts received indicate inevitable confusion. The uncertainty of title the peculiar circumstances recited herein heretofore in detail, the unlikelihood of Congressional action, and the still less likelihood of ability to enforce such probable action this summer, makes it manifest that throughout that arctic region in 1900 the rule will prevail "that they shall take who have the power and they shall keep who can." Shotgun title may be submitted in evidence before a quiet court of local but sufficient jurisdiction, the apparent idea being to exhaust the ground before the unwieldy process of Federal law can even get to the preliminary injunction.

The arrival of the thirty vessels within ten days of each other and their 30,000 passengers and their enormous cargoes of freight will be another source of present confusion, all landing together on a two-mile strip of sand beach from vessels compelled to lie off shore four miles, relying on the hundreds of light boats tossing in the surf to get freight and passengers ashore.

There is enormous present profit in the business to outfiters and transportation companies. Instances are furnished where a vessel costing but $20,000 gets $80,000 freight money for one trip. Those who furnish the supplies and carry the passengers will not be the first to decry the possibilities of the new El Dorado.

Nome reports that powers of attorney have been used so extensively at Cape Nome this winter that it is doubtful if any of the 20,000 men now rushing northward will be able to secure claims in Nome, York or the contiguous districts. A. Ellis, writing from Juneau, says that several hundred men at Nome have spent the entire winter locating thousands of claims for themselves and for others by power of attorney. It is yet unknown at Nome whether the powers of attorney will be recognized by the Federal officers arriving this summer to administer the laws. Ellis says the rich part of the beach, so far as prospected, is limited to 10 miles.

The Alaska Mexican mine's report for 1899 shows 166,054 tons ore mined and milled, from which there was saved $231,841, or $1.40 per ton on the mill. There were 3053 tons concentrates treated, yielding $115,574, equal to $37.85 per ton of sulphurets, or $0.69 per ton of ore milled. Adding $1682 for interest, the receipts were $349,097. The ore averaged $2.09 per ton, and the expenses were $286,764, or $1.73 per ton. This leaves $62,823 for net earnings. The dividends were $72,000, equal to 8% on the outstanding stock. The balance carried over from 1898 was $59,641, but $9667 of that surplus was drawn to make out the dividends, so that the surplus carried over from 1899 is only $49,975. The mill was operated 357 days out of a possible 363 days for the full 120 stamps. The average number employed, including Indians, was 160, at an average cost, including board, of $3.24 per diem.

Bulletin: The steamer Orizaba is at San Francisco to load lumber for Douglas Island for the Alaska-Treadwell M. Co., to be used in repairing the original mill property. This mill has 240 stamps and can be run by either steam or water power. The new mill of the same company has 300 stamps, for water power only. This makes 540 stamps. The Alaska-Mexican Co. has a mill of 120 stamps, run by steam or water power. The Alaska United Co. has a mill of 100 stamps on its 700-foot claim and another of 120 stamps running on ore from the Ready Bullion claim. Altogether the three Douglas Island companies have five mills, carrying in all 880 stamps. It is not intended to add further mill facilities for the present. The concentrates are smelted at Tacoma.

ARIZONA.

COCHISE COUTNY.

(Special Correspondence).—The Lowell-Arizona mine started work about fifteen months ago and now have a shaft down 517 feet; the company has done nearly 3800 feet of drifting. They have ore on every level in good quantities and grade and are beginning to think that they are nearly ready for a smelter. At present they are putting in a 14x15 double-reel, flat-cable engine, built by the Union Iron Works. The boilers are here and in position, and the engine and other machinery left San Francisco on May 19th and should be here this week. The company expects to open up about Aug. 1st. They are now doing most of their work on the 400 level in a body of ore. They also have three drifts going on the 500 level, one of which is in ore.

There are no veins to follow in this country, as the ore seems to lie in deposits and blankets. There is a zone about 1500 feet wide where you may expect to find ore, but you have nothing to follow, and have just to cut the country and run chances of finding it.

The Lowell-Arizona have been shipping lead ore—which is a carbonate—but have not shipped any copper, as they expect to smelt it there.

There are six companies operating here now. A good many others operating in this county are doing considerable work with good success. The company I mention is working thirty-eight men.

It is reported here to-day that the South Bisbee C. M. & T. I. Co. have encountered a rich body of ore on their 700 level.

The Cochise Co. are working ten men.

Bisbee, May 22.

Laub City reports a strike of gold bearing quartz on the Emmersly claim. A new ore body of sulphide copper in the East Off is now 21 feet through. The Forman tunnel is in 208 feet and has passed through strata of copper ore assaying 17%. The proposed townsite of Laub City is to be abandoned. The smelter site will be close to the Copper Reef. T. A. McCullough, formerly of Anaconda, Montana, is now assistant to Gen. Mgr. Noonan.

Johnson, in the Dragoons, 3 miles from Russelville, has a population of 300. At the Peabody mine 165 Mexican miners are employed. Two carloads of copper ore are shipped to El Paso daily. The Peabody is under the supervision of H. J. Clifford. At the Mammoth mines thirty-five Americans are employed.

GILA COUNTY.

At the Black Warrior Copper Co.'s leaching works they will have to get their own acid plant installed, as acid shipped in costs $40 per ton. They expect to be able to make it at their works for $6 to $10 per ton. Twenty tons of acid per day are required for the leaching works.

GRAHAM COUNTY.

A. C. Ross, who owns copper properties at Chase creek, will put in a 100-ton concentrator. J. F. Niccolls is in charge.

MOJAVE COUNTY.

At Chloride the Elkhart mine resumed work this week. The Schuylkill mine is also to resume work on its ore bodies.

Miner: There are now fifty-five men on the payroll of the Tennessee mine at Chloride. The underground workings of the mine are being put in good shape and the stopes show ore. Two big shafts will probably be sunk another 100 feet.——The Homestake mill near Pyramid, on the Colorado river, has started up. The main shaft is 369 feet deep.——About a mile from the Homestake, on the Arizona side of the river, is the Sheeptrail mill, crushing thirty tons of ore daily.

PINAL COUNTY.

R. Truman, Gen. Mgr. Ray Copper Co. on Mineral creek, 20 miles south of Globe, has an ore body averaging 5% copper. The company is working thirty miners. The ore is conveyed over the 30-inch guage railroad to the mill, at Kelvin, 6½ miles below on the Gila river. A train is eight cars, ten tons capacity. The new concentrating mill at Kelvin will be in operation next week. Its capacity is 250 tons ore daily.

YAVAPAI COUNTY.

The Congress Gold Co. will put in a pipe line from Date creek to its mill at Congress, 6 miles.

The Lyons 10-stamp mill is bought by W. B. Troy for the Trilby and Belle gold mines.

The Verde Queen smelter at Jerome is to start up this week.

The Arizona, Eastern & Montana Co., at a recent meeting of directors in New York, appointed W. Stickney Gen. Supt. of all their property in this county.

At Weaver the Octave G. M. Co. have the 40-stamp mill completed. Weaver reports the discovery of gold and silver in porphyry.

The result of the appeal from the ruling of the Tax Commissioners by the United Verde Copper Co. to the Supreme Court, for a review of the assessment levied upon the corporation for the year 1899, is that the N. Y. Supreme Court has increased the assessment from $1,440,532 to $2,373,920.

Jerome figures that the Equator, owned by W. A. Clark, has $2,000,000 worth of ore blocked out.

The Congress gold mine, owned by the Congress G. M. Co., 60 miles north of Phœnix, is bonded for $1,500,000 to New York men, including Warner Miller and John Mackay. The first payment, $200,000, was made on May 31.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—I see in the issue of May 19th that some Colorado men want to know about Camp Contreras. Supt. Joyce has a 4-stamp mill at the Defender mine and is going to make it ten. The shaft is 251 feet deep; from an 8-foot ledge ore goes to Ione, thence to the Selby Smelting Works. Near the Defender is the Poker Bill, which is now yielding ore very heavily sulphureted.

Camp Contreras, May 25.

Supt. Purington of the Fremont Consolidated mine, Drytown, has the new shaft down 300 feet. At the Gover the new hoist is being built.

Supt. Dye will resume work on the Amador Queen No. 1 mine this week.

The Argonaut at Jackson paid in dividends for the latter half of April and the first half of May $10,000.

At the Oneida at Jackson the new shaft is down 2100 feet. Work on the new 100-stamp mill is being pushed.

At the Nugget mine at Ione A. L. Adams, the principal owner, is building a 5-stamp mill.

CALAVERAS COUNTY.

In May the Gwin declared dividends to the amount of $5000.

The Shear-Lloyd mine on Central Hill is bonded to D. McN. Palmer.

The Ione Echo says that Blodgett & Fassett last week brought in forty ounces of gold as the result of their week's work in the Touhey mine.

At Mokelumne Hill the French Hill tunnel to tap the quartz ledge is completed. The vein at the point encountered is 5 feet in width and shows free gold.

Supt. Langford has rehabilitated the old Sheep Ranch mine; the 20-stamp mill and four concentrators are in operation. Eighty men are at work.

DEL NORTE COUNTY.

W. M. Brown, owner Blacksand mine, Crescent City, has started operations.

A. McVivier has taken charge of the Jones Creek M. Co.'s property at Big Flat. Men are enlarging the ditch and preparing for active mining.

MADERA COUNTY.

(Special Correspondence).—The copper smelter at Madera is running steadily. It is reported that the company will soon be prepared to work sulphuret ores of gold and silver and concentrates.

In Fine Gold district the Mud Springs mill is running steadily night and day on good ore. Sixteen men are employed. The Lily mine is shut down temporarily. The Standard has opened a 4-foot shoot of ore on the 140-foot level. Ore has also been found at the bottom of the main shaft at 400 feet. The Bryan mill at the Standard mine, on Fine Gold creek, has had a satisfactory preliminary test. The Magnet M. Co. has driven a tunnel into the vein along the hanging wall on the Noonday location. An ore shoot 4 feet wide has been opened up by a winze and drift. About forty tons of ore on the dump taken out of the workings averages well in free gold, with 1½% of sulphurets. A small mill will now be built. The new 10-stamp mill will soon be in place at the Waterloo and operations resumed.

Gold, May 29.

The Gambetta M. & M. Co. at Grub Gulch write that they want to let a contract for 2000 cords of wood.

MARIPOSA COUNTY.

Supt. Schafer of the Yankee mine, Benton mills, projects the expenditure of $50,000 in developing the property and putting in a mill.

Seven miles from Mariposa, fire on the 27th ult., at the Persia mine, destroyed a 10-stamp mill, the hoisting works and shop. The boarding house was shattered by the explosion of 200 pounds of giant powder. The fire started near the rock crusher at the top of the mill.

NEVADA COUNTY.

(Special Correspondence).—During the past year the Grass Valley Exploration Co. has acquired considerable additional ground, has paid a monthly dividend of $2500, aggregating $30,000, has spent $80,000 for new properties and has $581 in the treasury.

Grass Valley, May 28.

PLACER COUNTY.

A tunnel 1500 feet long is to be driven at Spring Garden, near Forest Hill, to tap the channels of the divide.

The Sentinel reports a strike in the Breece & Wheeler, or Paragon mine, near Bath, of a lead of blue gravel.

PLUMAS COUNTY.

For hauling 200,000 pounds of freight from Oroville to the East Branch—the machinery for a 20-stamp quartz mill and a saw mill, to be erected on the Halstead property—requires that the machinery will have to be packed, hauled on skids and a road made to the place where it is needed.

The Brandt quartz mine is in Argentine district and is known as the Crown Point. Lescher & Gobert have bought it and will erect a mill at the Crown Point. Ohio capital is backing them.

SAN BERNARDINO COUNTY.

The new diggings are north of Barstow. Some of the ground is rich. Bedrock is close to the surface. There are 200 men there now and more going. The nearest water is 8 miles away at Lane's wells. The camp is 15 miles north of Barstow and 45 miles southeast of Randsburg. Dry washers are in demand.

SIERRA COUNTY.

Supt. Dunlap, at the Alaska mine, Pike City, is running a drain tunnel. The mill will be operated on the old Alaska dump, which has been connected with the 20-stamp mill by steel rail tracks 800 feet long. The dump contains 50,000 tons, which is estimated to run $3 a ton. The mill will start night and day work next week.

SISKIYOU COUNTY.

(Special Correspondence).—A gold nugget was found by Wm. Klein of Rollin in his placer mine on May 21st, on Eddy gulch, 2½ miles above Sawyer's Bar, from which gulch it is claimed by ex-Governor Daggett and others several million dollars have been taken and that there are great values still there. The mine from which this nugget was taken was recently bought by Mr. Klein from John Hamilton, who got the Cape Nome fever and sold this property to Mr. Klein at a low figure. Mr. Klein found a $98 nugget near the same place where this one was found a few days prior to this one. The former owner had worked within 4 feet of these nuggets. The size is 5 inches long, 2½ wide; weight, 50 ounces; and is worth $775.12.

Sawyer's Bar, May 28.

From the Dewey mine, Gazelle district, a carload a day is shipped to Keswick, Shasta county.

The dredger in Yreka creek, at Hawkinsville, is ready for starting.

The Greenhorn blue gravel mine is at the 100-foot level.

At Cecilville the Deep Bank mine, owned by Mr. Cooper of San Jose, is employing ten men.

TRINITY COUNTY.

The T. G. P. M. S. Ltd. Co. is building a ditch to drain drift mining ground at the junction of Union and Coffee creeks.

At the Loftus mine Supt. Murray is pushing work on the lower tunnel.

TUOLUMNE COUNTY.

The County Miners' Association has elected W. H. McClintock president, F. Sutton secretary and J. McCormick treasurer.

Latest advices from Santa Ysabel directors are that the report of Expert Foster is satisfactory. The company will issue a statement shortly.

The Boston News Bureau says that the directors are "negotiating with capable mining men to take charge of the property." W. Foster advises following the ore chute in the Knox & Boyle property, also the Central ore chute. He values the ore in the bottom of the mine, as opened, at $17 per ton, and declares the chances for a paying mine are good, with proper management. The company's floating debt is about $75,000, of which $35,000 is due next January, and the noteholders are willing to extend the same for a year.

YUBA COUNTY.

(Special Correspondence.)—The Victor G. M. Co. owns a group of mines at Brown's Valley. Work was begun four years ago by Frank Page, in the interest of Charles Webb Howard of San Francisco, after the properties had lain idle since the 50's. The equipment put in was expensive, and the operating expenses, with steam power, heavy. The motive power is now electricity from the Yuba Power Co. The mine is run at a profit. Work begun by Mr. Page at the Donnebroge shaft, near which the 20-

stamp mill is located, has been discontinued, and the ore now all comes from the Pennsylvania shaft, and largely from the Bulldog ledge, which is high grade and dry. A large body of water is caught at the 900 level of the Pennsylvania shaft and is there thrown to the surface by an electrically propelled pump stationed at that level. The ore, after being raised by an electric hoist, is conveyed over an electric tramway 1200 feet to the mill, where the twenty stamps, weighing 1000 pounds each, and dropping 100 times to the minute, crush seventy tons of ore per day. The electric motor furnishing all the power used at mine and mill is rated at 280 H. P., but sometimes carries a load of 350 H. P. The machinery is belted to one side only of the main shaft, which is not an economical power arrangement. The air compressor, which runs six drills in mine, is a second-hand machine rated for sixteen drills. The Pennsylvania shaft follows the ledge, at an angle of 40%, to a depth of 900 feet; 500 feet north of this point a winze has been extended 300 feet into the Bulldog ledge. Drifts north and south from the winze supply most of the ore now being worked. An upraise is being put in to connect with an old shaft near the mill, which latter shaft has recently been cleared out. This will improve the ventilation of the mine. G. Lezinsky of San Francisco is general manager of the Victor properties; C. N. Morse, assistant manager; Naylor Williams, foreman.

The Silent Friend gravel mine is a new enterprise at Brown's Valley. Five residents of the locality, viz.: Naylor Williams, T. J. Hibbert, T. Sutcliffe, Fred Culbert and Dr. G. S. Holbrook, are convinced that an ancient river channel courses through the flat country near the town. Former gravel workings, which proved profitable in their day, lend encouragement to their faith. They are now sinking a vertical shaft about a half mile from the Pennsylvania mine, and expect to go 50 or 60 feet before striking bedrock. They will then drift to find pay dirt. At 20 feet considerable water came into the shaft, and they have rigged up a gasoline engine to dispose of this water flow. Considerable interest centers in their enterprise.

Campbell's gravel mine, at Smartsville, is again one of the active properties of Yuba county. A company, headed by Irwin & Stillwell of San Francisco, has a ten years' lease of the property. The enterprise was promoted by W. Coleman, who retains an interest. They have a permit from the Debris Commission to ground sluice into the canyon below, where a retaining barrier has been constructed, the material of an extensive slide which covers a portion of the blue lead. When uncovered, the lead will be worked from an open pit. There are three strata of gravel in the top ground, which, besides the material of the blue lead, will be disintegrated in specially constructed mills, capacity twenty tons per hour. One of these mills is now working on gravel from a portion of the mine distant from the slide alluded to. Another mill is to be started by the 15th of July. The gravel in question yields several colors in nearly every pan. They say it can be worked for 3 cents per ton, and is thought to be worth 50 cents per ton for the whole mass. The mills will be run by water, under a head of 288 feet. At present, in the ground-sluicing operations 1000 miners' inches of water fall, for four hours each day, over a high bank upon the caved material, and the latter is being gradually sluiced into the ravine through Mr. Campbell's old bedrock tunnel and new conduits. The new Blue Point enterprise has given an old-time activity to Smartsville, and the work is being watched with interest, if not solicitude, by all residents. David Bradbury, a gravel miner of experience, is superintendent. F. B. Simonds will have charge of the mill work. About fifteen men are employed.

Smartsville, May 28.

Supt. Wright, at the Blue Point gravel mine near Smartsville, has a mill with 300-ton capacity which has just started up on gravel paying $1 per ton.

COLORADO.

BOULDER COUNTY.

The Golden Eagle, at Salina, is reported to have opened a 15-inch vein of sylvanite ore in the breast of the tunnel, 300 feet from the mouth. It is expected to run twenty ounces gold.

At Ward, the B. & M. mine shows new strikes. The ore in the east 800 drift runs $148 in gold and four ounces in silver.

Ward Miner: The Nugget Co. is pushing development. The pay streak of ore has widened to 33 feet. The site of the old mill burned has been cleared and graded, preparatory to building a new one. The tramway, 3500 feet in length, is to be repaired.——At the Ward - Rose mine, Mgr. Donaldson is driving the 200 level east and west and pushing the breast of the J. S. tunnel toward the main lead of the property.

CHAFFEE COUNTY.

At the Tasmania mine Mgr. Smith has the ore bins and stopes full awaiting the blowing in of the matte smelter at Winfield.

B. T. Brooks has resigned as superintendent Sedalia mine.

CLEAR CREEK COUNTY.

Regarding the Stanley mine at Idaho Springs, G. J. Riner of Montreal, now at the property, says the mill is to be one of 100 stamps.

At Empire, the Gold Fissure M. Co. is preparing to expend $35,000 on a shaft house and hoisting machinery. The shaft is to be three compartment, 5x15 feet in the clear.

GILPIN COUNTY.

The Rapidan M. & M. Co. have resumed work on the Cœur d'Alene property. Sinking will be continued 100 feet farther.

Joy, Abbott & Baldwin, at the East Whiting mine, have twelve men shipping ore.

At the Mechanic's lode on Gunnell hill, Capt. Bolthoff, of the Hendrie & Bolthoff Mfg. Co., owner of the property, will put up one of his first motion hoisters and a new shaft building.

HUERFANO COUNTY.

At Walsenburg the Grand View, Scantic and the mines on the McMillian property, in the Blanca district, have resumed operations.

LAKE COUNTY.

Leadville's zinc production is increasing. The heaviest producers of this ore at present are the Adams, Moyer, Small Hopes and the Mard. Much of the zinc product goes to foreign countries, and a shipment of about 2000 tons was made last week to the Belgium zinc plant.

Supt. Wallace of the Tasmania M. Co. has taken the men from No. 3 crosscut tunnel and put them to work on the north drift of the No. 2 workings, breaking ore until the surface water lessens.

The Union smelter has closed down, throwing 175 men out of employment.

The Ibex or Little Johnny mine, in the Leadville gold belt, has 86 miles of levels and other openings in the different veins of the group. This is about as extensively developed a property as any in Colorado.

Miner: At Leadville the American Salvage Co. of Kansas City has started up its sludge mill at the President mine at St. Kevin.

LA PLATA COUNTY.

Near Durango, the old San Juan smelter, now in control of the American Smelting & Refining Co., is running four stacks and seven roasters. Arrangements are in progress for doubling its capacity.

LAS ANIMAS COUNTY.

Supt. Dorn of the Abe Lincoln has driven the tunnel into old Baldy mountain 650 feet, gaining a depth of nearly 600 feet, making it the deepest workings in Trinidad.

SAN JUAN COUNTY.

(Special Correspondence). — The Iowa M. & M. Co. have extended their tramway line from the mill to the railroad—a distance of over a mile.

Silverton, May 25.

Silverton Standard: The concentrating of tungsten ores at Cement creek has begun by Voillique & Roulet, who have leased the Fischer mill; they are also dealers in uranium ores, having in the Paradox valley the only paying uranium mines in the locality.

SAN MIGUEL COUNTY.

At the Butterfly-Terrible group, Ophir, a nine days' run of ore netted the company above treatment and transportation charges $1451, besides $430 in concentrates. Three cars of concentrates have been sent to the Durango smelter. D. Sayer is manager of the company.

At Telluride, Mgr. Mercer of the Liberty Bell M. Co. has forty stamps on the San Miguel river in operation. The cyanide plant connected with the mill is satisfactory. The Liberty Bell mines, in Cornet creek, will produce 300 tons every twenty-four hours.

Miner: Near Ouray, the Revenue tunnel is being driven by the Caroline M. Co. The tunnel was driven in two miles from the Ouray side, tapping the vein at a depth of 2200 feet from the surface and giving miles of stoping ground. The shaft was down 1400 feet and an incline was run down connecting the bottom with the tunnel 800 feet deeper. The ore carries values in silver, gold, copper and lead and is run through the 80-stamp mill. Nearly 600 men are employed; 400 tons crude ore are sent through the tunnel daily. H. W. Reed is manager. The Ophir tunnel from the Telluride side of the divide with a length of two miles will cut the formation at a depth of 2000 feet and eventually connect with the Revenue tunnel. The Ophir is now in a mile and a half.

SUMMIT COUNTY.

At Breckenridge the Journal reports the No. 4 Risdon dredge boat of the North American Gold Dredging Co. at work in the Swan river. An Evans hydraulic lift plant will be put at work.

The Augusta M. & M. Co. will drive the crosscut tunnel a further distance of 1000 feet. The tunnel will cut the vein, which was opened in the Juventa shaft, at a depth of 630 feet.

The Jessie is the largest shipper of concentrates in the district, says the Breckenridge Journal. The monthly shipments average about 200 tons. A shortage of water for months has at times prevented the use of the entire forty stamps of the mill, which is said to have a capacity for handling seventy tons of ore per twenty-four hours.

TELLER COUNTY.

(Special Correspondence).—The Clyde, being developed by Detroit parties, has put in a 12x14 steam hoist and an air compressor over their 550-foot shaft.

The Strong management are putting up a new shaft house, gallows-frame and boiler and engine room, which will prepare the way for a larger tonnage.

Victor, May 28.

Local papers say that "New York bankers offer $5 a share for 1,500,000 shares of Portland," and that the directors will increase the monthly dividend to 3 cents a share at the next meeting of the board, June 5.

The Easter Bell Co. is to sink a compartment shaft 400 feet, at a point where the Isabella and Victor veins can be reached with a crosscut.

The Victor mill has a new 400-ton crusher, a 500-ton set of rolls and additional automatic samplers.

An assessment of 15 cents per share has been called for from holders of Anaconda stock. The company owes $112,000, and interest amounting to $17,000 additional.

Cripple Creek reports a strike of sylvanite in the Bernard lease on the Australia, west slope of Beacon hill. In a crosscut of the Standard tunnel, at a depth of 600 feet, 4 inches assay 500 ounces gold to the ton. The property is owned by the Little May G. M. Co.

The Pharmacist mine at Altman has resumed.

IDAHO.

The Big Buffalo Co. is locally credited with intent to put up a 50-stamp mill at Buffalo Hump this summer, and to expend $200,000 in development work before realizing a dollar. This company has purchased thirty-five claims at a cost of $300,000.

KOOTENAI COUNTY.

A. S. Crawford, manager Cœur d'Alene M. & M. Co., in Cœur d'Alene, is sinking on the Sherman and has reached a depth of 250 feet.

OWYHEE COUNTY.

Avalanche: In the War Eagle mines the Tunnel Co. is employing thirty-five men; the tunnel is in 1300 feet.——The Cumberland mill is pounding away on its preliminary run. Machine drill men can find employment at this property.——The Dernier Resort and Red Jacket mines have suspended work temporarily on account of surface water from melting snow. A limited number of good miners can find employment in this camp.

SHOSHONE COUNTY.

At Wallace W. Snyder has agreed with the Golden Chest M. Co. to transfer all his interest in the Paymaster group of claims, Idaho stamp mill and other property in connection therewith for the consideration of $24,305.82. The company now will undertake a tunnel from near the creek level to tap the Paymaster group, Golden Chest and Dora and Katie claims. They have the largest group of gold-bearing quartz ground in the Cœur d'Alenes. The Idaho and both of the old Golden Chest mills will be run. It is the intention to put in a small cyanide plant.

At Wallace the Bimetallic M. Co. has begun on a 550-foot tunnel on its Nine Mile property, a contract for 300 feet having been let.

MICHIGAN.

At Calumet 3000 men are idle owing to a fire in No. 2 Hecla shaft of the Calumet & Hecla mine. The management decided to close down all except the South Hecla and amygdaloid shafts on account of gas from the fire, which has gone to all parts of the Calumet branch and part of the Hecla.

MONTANA.

BEAVERHEAD COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs., 7,822.485; value, $161,705.11. Silver, fine ozs. (coining value), 253,262.01; value, $327,449.87. Copper, fine lbs., at $16.67 per cwt., 165,719; value, $27,625.36. Lead, fine lbs., at $4.47 per cwt., 1,038,894; value, $46,438.56. Total $563,218.90.

BROADWATER COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs., 8,262.627; value, $170,803.66. Silver, fine ozs., (coining value), 144,948.35; value, $187,407.96. Lead, fine lbs., at $4.47 per cwt., 1,088,036; value, $48,635.21. Total, $406,846.83.

CASCADE COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs., 2,128.526; value, $44,000.54. Silver, fine ozs. (coining value), 912,723.21; value $1,180,086.57. Lead, fine lbs., at $4.47 per cwt., 3,810,679; value, $170,337.35. Total, $1,394,424.46.

At Great Falls the smelter branch of the street railway is in operation, and is 8400 feet in length. It cost $250,000.

Montana mine dividends for the first five months of the year are: Amalgamated, $3,000,000; Anaconda, $2,400,000; Boston & Montana, $2,700,000; Montana Ore Purchasing Co., $80,000; Parrot, $345,000; Montana Coal & Coke Co., $60,000; Florence, $22,000. Total, $8,607,000.

Anaconda Standard: The Diamond R. concentrator at Neihart is ready to start. The ore cars will carry four tons each by the gravity system. E. McCool is millman.

DEER LODGE COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs., 10,349.123; value, $213,935.36. Silver, fine ozs. (coining value), 4,493.37; value, $5809.60. Copper, fine lbs., at $16.67 per cwt., 50,000; value, $8335.00. Total, $228,079.96.

The Standard says the Anaconda C. M. Co. will this month begin to build the largest copper smelting plant in the world, on the foothills east of Anaconda. As a starter, the company advertises for bids for 100,000 cubic yards excavation and 25,000 yards masonry. The concentrator will be 625x349 feet; the roaster building, 98x330 feet; the reverberatory building, 176x408 feet; in that will be fourteen reverberatory furnaces, each 24x60 feet. The blast furnace building will be 82x280 feet; it will contain five furnaces, each 54x180 inches. Coke will be the fuel to produce the copper matte. The converter will be 174x462 feet. There will be 8000 H. P. The capacity will be 5000 tons daily. The plant will be ready about August 1, 1901.

FERGUS COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs, 8,883.774; value $183,643.91. Silver, fine ozs. (coining value), 5380.64; value, $6956.78. Total, $190,600.69.

FLATHEAD COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs., 802.264; value, $16,584.27. Silver fine ozs. (coining value), 47,380.14; value, $61,259.16. Lead, fine lbs., at $4.47 per cwt., 1,066,199; value, $47,659.10. Total, $125,502.53.

Near Kalispell the Sullivan G. M. Co. had a ton of ore sent to the smelter at Great Falls for a test. The result was the following: Copper, 18.7%; silver, 24.4 ounces; gold, $18.24. The ledge is 3 feet wide; formation granite and slate.

GRANITE COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs., 7958.448; value, $164,515.72. Silver, fine ozs. (coining value), 1,989,213.53; value, $2,571,912.44. Total, $2,736,426.16.

JEFFERSON COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs., 7415.708; value, $153,296.29. Silver, fine ozs. (coining value), 887,929.36; value, $1,148,029.88. Copper, fine lbs., at $16.67 per cwt., 25,687; value, $4,282.02. Lead, fine lbs., at $4.47 per cwt., 1,400,880; value, $62,619.34. Total, $1,368,227.53.

LEWIS AND CLARKE COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs, 62,535.675; value, $1,292,727.13. Silver, fine ozs. (coining value), 203,251.90; value, $262,790.33. Lead, fine lbs., at $4.47 per cwt., 500,000; value, $22,350.00. Total, $1,577,867.46.

MADISON COUNTY.

The ore mined in this county during 1899 produced as follows: Gold, fine ozs., 23,708.977; value, $490,108.05. Silver, fine ozs. (coining value), 104,350.74; value, $134,918.12. Copper, fine lbs., at $16.67 per cwt., 40,000; value, $6668. Lead, fine lbs., at $4.47 per cwt., 370,477; value, $16,560.32. Total value, $648,254.49.

The Maggie A. Gibson and Gordon gold dredgers, at the mouth of Alder gulch, have resumed. The largest nugget yet dug up by the boats was a $3 "scad" picked up last week.

MEAGHER COUNTY.

The ore mined in this county during 1899 produced as follows: Gold, fine ozs., 242,857; value, $5020.30. Silver, fine ozs. (coin-

ing value), 150,020.86; value, $193,966.35. Lead, fine lbs., at $4.47 per cwt., 5,000,000; value, $223,500. Total value, $422,486.66.

MISSOULA COUNTY.

The ore mined in this county from placer mines in 1899 produced as follows: Gold, fine ozs., 2749.898; value, $56,845.44. Silver, fine ozs. (coining value), 100.96: value, $130.53. Total value, $56,975.97.

PARK COUNTY.

The ore mined in this county during 1899 produced as follows: Gold, fine ozs., 5883.176; value, $121,616.04. Silver, fine ozs. (coining value), 458.72; value, $593.09. Total value, $122,209.13.

SILVER BOW COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs., 62,038,377; value, $1,282,447.08. Silver, fine ozs. (coining value), 9,855,831.97; value, $12,742,492.86. Copper, fine lbs., at $16.67 per cwt., 245,245,908; value, $40,882,492.86. Total value, $54,907,833.82.

NEVADA.

LANDER COUNTY.

The Morning Star mine at Dean has resumed operations.

STOREY COUNTY.

Official returns from the Con. Cal. & Va. office of the bullion product of that mine for the month of March, from ore crushed and concentrated at the Kinkead mill, show the amount of ore crushed by the mill was 271 tons and 505 pounds. The Selby smelter's assay value of the concentrates was: Gold, $3797.69; silver at 1.2929, $8200.68; total, $11,998.37; bullion bar assaying $165.04 in gold and silver at 1.2929, $8.92; total, $173.9; total assay value of concentrates, $12,172.33; bullion value per ton, gold $14.60; silver $30.26; total $44.87; assay value per ton per battery samples, gold $16.59; silver at 1.2929, $46.57; total $63.16; yield per cent per battery samples, gold 88; silver 65; aggregate per cent, 71; assay value of the above per ton, shipping value, gold $23.39; silver at 1.2929, $53.99; total $77.38. The concentrates from the above ore and one bar of bullion gained from settlings were sent to the Selby Smelting & Lead Works, whose settlement was: 283 sacks of concentrates, gross weight 21,480 pounds; tare on sacks, 520 pounds; moisture in concentrates, 4%, 838 pounds; total tare, 1358 pounds; net weight of concentrates, 20,122 pounds; contents of concentrates, gold $3797.69, or 183.714 ounces, at $19.50 per ounce, $3582.42; silver $8200.86, or 6342.86 ounces, less 5%, or 317.86 ounces; total 6025.72 ounces, at 59⅜ cents per ounce, $3592.83; total value of contents, $7175.25. The bar of bullion contained, gold $165.04, silver $3.82; total $168.86; charges $1.64; total $167.22. The total gross returns were $7342.47; treatment charges for 10 tons and 122 pounds of concentrates at $11 amounted to $110.67; freight on concentrates to Vallejo Junction, $189.99; total charges, $300.66. The coin received at the San Francisco office was $7041.81. The reduction of the ore at the Kinkead mill, 271 tons and 505 pounds, at $2.50 per ton, amounted to $678.12; hauling and railroad freight on empty sacks, $1.58; hauling concentrates, $8.15; Comstock Tunnel Co.'s royalty on $7342.47 at 4%, $293.69; total charges, $981.54; net returns, $6060.27.

NEW MEXICO.

BERNALILLO COUNTY.

The New Mexican says that scores of prospectors have outfitted at Bland and taken to the hills since the spring season opened. Media Dia, Cochiti and Peralta canyons are going to be thoroughly prospected this summer.

COLFAX COUNTY.

Work is to be resumed on the Golden Era mill at Elizabethtown.

Three shifts are pushing the Blue Bandana tunnel, now in 400 feet.

GRANT COUNTY.

The Volcano mine, Volcano district, is sold to Pennsylvania men for $15,000. It is the intention to commence work this month and build a 10-stamp mill.

The Western Bell property, Gold Hill district, has been leased and bonded to W. G. Meyers of Massachusetts. The option was given for a term of five months; the purchase price is $15,000. The new management began work this week.

LINCOLN COUNTY.

The American Placer Co. is reported to have acquired placer lands, embracing 5000 acres, from the Jicarilla Placer Co. for $350,000. The company will operate with hydraulic and dredging machines at a cost of $100,000.

OREGON.

BAKER COUNTY.

H. S. Sherard, Mgr. Venus Con. G. M. Co., Cracker Creek district, says active development work is in progress on the Venus.

JOSEPHINE COUNTY.

(Special Correspondence). — We have now a postoffice at Greenback mining camp, Alta by name. Supt. Thompson runs the mine and 10-stamp mill, and is postmaster. There are fifty men employed.

Alta, May 25.

Silver State: A suit involving the title to the Gold Bug mine, near Grant's Pass, owned by Jones, Gorham, Lester & James, is decided in their favor at Portland by the U. S. Circuit Court.

UNION COUNTY.

The Northwest Copper Co.'s mine at Iron Dyke was sold last week by the U. S. Court to C. M. Warner of Pennsylvania for $85,000.

UTAH.

BEAVER COUNTY.

The ore mined in this county during 1899 produced as follows: Gold, fine ozs., 1083.716; value, $32,738.32. Silver, fine ozs. (coining value), 244,939; value, $316,688 80. Copper, fine lbs. at $16.67 per cwt., 918,292; value, $153,079.28. Lead, fine lbs. at $4.47 per cwt., 4,983,453; value, $222,760.35. Total, $725,266.75.

CACHE COUNTY.

Near Logan, at the King mine, a carload of ore gave samples showing lead 64%, silver 3.90 ounces, gold .020%, iron 4.8%, zinc 1%, sulphur 8.6%.

CARBON COUNTY.

Coal Mine Inspector Gomer Thomas, from Scofield, tells the Tribune that the camp is gradually taking on its old-time air, and that No. 1 mine will start up again with 200 men. "They will have the safest mine in the world from now on. Every precaution that is known to miners or that money can buy will be used. Among the new rules will be one that six pounds of powder will be the maximum amount that any one miner will be allowed to have in his possession in the mine at any one time."

JUAB COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs., 44,917.386; value, $918,188.86. Silver, fine ozs. (coining value), 3,329,833.10; value, $4,305,238.75. Copper, fine lbs. at $16.67 per cwt., 3,441,667; value, $573,727.56. Lead, fine lbs. at $4.47 per cwt., 38,080,904; value, $1,702,216.41. Total, $7,499,371.56.

At Eureka N. Dunyon, former superintendent Centennial-Eureka, has arranged for resumption of work at the Tiernan mine. T. Mansfield has been engaged to direct operations.

The strike in the Solid Muldoon claim of the Bullion-Beck gives indication of being a big ore body.

Sylvanite is reported discovered in the property of the Star Con. M. Co., near Eureka.

The properties of the Sioux and Utah mining companies at Tintic have been closed down.

Mgr. Hunt, at the May Day, Eureka, has 3 feet of ore, going 68 ounces gold and 630 ounces silver to the ton.

The Lower Mammoth will ship its low-grade ore to the Salt Lake smelters.

SALT LAKE COUNTY.

The ore mined in this county in 1899 produced as follows: Gold, fine ozs., 8611.360; value, $178,013.03. Silver, fine ozs. (coining value), 201,801.44; value, $260,914.97. Copper, fine lbs. at $16.67 per cwt., 4,145,028; value, $690,976.17. Lead, fine lbs. at $4.47 per cwt., 2,334,731; value, $104,362.48. Total, $1,234,266.65.

B. Sewell, Vice-Pres. American Smelting & Refining Co., says they will build a $1,000,000 smelter, near Sandy, to take the place of the Germania, Mingo and Hanauer plants, which are to be dismantled.

SUMMIT COUNTY.

The ore mined in this county during 1899 produced as follows: Gold, fine ozs., 8803.797; value, $181,990.63; Silver, fine ozs. (coining value), 3,152,329.78; value, $4,075,739.49. Copper, fine lbs. at $16.67 per cwt., 805,347; value, $34,251.34. Lead, fine lbs. at $4.47 per cwt., 41,884,755; value, $1,872,242.55. Total, $6,264,230.01.

TOOELE COUNTY.

The ore mined in this county during 1899 produced as follows: Gold, fine ozs., 106,214.609; value, $2,195,650.83. Silver, fine ozs. (coining value), 225,705.01; value, $291,820.72. Total, $2,487,471.55.

The Mercur mine now employs 125 men.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Homestake cyanide plant at Lead will be 342 feet by 160 feet—the largest cyanide plant in the country—capacity 1200 tons per day. The tailings from the stamp mills retain $1.50 in gold. This loss has been going on for twenty years, and has been carried down the creek and deposited in the shape of concentrates, which have been shoveled out in many places by miners and sold to the smelter for about $12 per ton. The Homestake Co. expects to be able to save about $1.25 out of the $1.50—a saving of $1500 per day.

WASHINGTON.

FERRY COUNTY.

At Republic Manager Lansing of the Republic Reduction Co. says the mill will commence crushing June 1st.

The Tom Thumb mine, Republic, will have $10,000 worth of new machinery this season.

FOREIGN.

AFRICA.

Rhodes, Beit and other men are credited in London with intent to develop mining in German West Africa, within 400 miles of Walfisch bay. C. James, a California miner, will head the prospecting expedition, which, it is announced, will leave England this month.

BRITISH COLUMBIA.

At Quesnelle Forks work on the Cariboo mine is being pushed and quantities of gravel are passing down the flumes.

English capital is to extensively develoo properties on Mount Sicker, Vancouver island, near Horse Shoe bay, 40 miles north of Victoria and 30 miles from Nanaimo. The group includes the Tyee, Herbert and Magic Fraction. The local director is Clermont Livingston of Cowichan Bay; the consulting engineer and metallurgist W. Pellew-Harvey of Vancouver. The latter has prepared a full report of the location and putative value of the property, with maps and sectional drawings.

MEXICO.

J. W. Brill tells Two Republics that "there are many claims being denounced in Oaxaca by Americans and paying well. In the Sierra Juarez, to the northeast of Oaxaca, the banner mine is La Natividad, in which many prominent Mexicans are interested. The peculiarity of this district is that the value of the gold and silver in the ore is almost always nearly the same. On the San Luis river a 20-stamp mill is being erected, to handle more especially low-grade ore. I am interested in La Victoria and La Tapada mines. We have little machinery and we have to freight our ore on burro back 65 miles to a railroad, and then send it to Monterey or to Aguascalientes to be smelted."

SOUTH AFRICA.

The news of the week from Johannesburg and Pretoria is of importance to manufacturers of mining machinery and industrial appliances in general. The occupancy of the Rand by the British of course ends all fear of further "commandeering" or threatened destruction of mining property.

There are about $40,000,000 worth of mining machinery in the Transvaal. Peace and the stimulus of development will doubtless double the amount. In every department of manufacture there will be demand. As an instance may be cited the inevitable demand for wire. The military authorities appropriated every mile of the metallic roping used on the farms for their own use, and it will be necessary to replace that thus taken and as much more.

A government notice had been issued by the Boer Executive to the effect that the bewaarplaatsen or depositing sites on the Rand would be sold by public auction in the Church Square, Pretoria, on June 25, when the conditions of the sale would be made known. The date of the sale was subsequently altered to July 9. This notice covered the disposal of property worth in all probability $8,000,000. Jumpers and Jumpers Deep would be particularly affected by the sale, but other companies which hold the surface rights to these bewaar platsen claims would also suffer severely had the Boers succeeded in their intention of disposing of these rights. In February A. Milner issued a proclamation giving the Boer government notice that all sales and forfeitures effected in the Transvaal subsequent to October 10 would not be recognized by England.

However, the events of the week render nugatory the proclamation.

The London Mining Journal says: Several of the Rand mining companies, especially of the deep level group, have within the last week or so published their annual reports, from which we are able to gather the value of the gold which the Government of the Transvaal have appropriated or commandeered up to the present time, although it does not follow that this represents, by any means, the whole extent of their depredations. The following table will be studied with interest:

Company.	Approximate value of gold seized.
Goldenhuis deep	£37,200
Rose Deep	30,450
Jumpers Deep	23,950
Ferreira Deep	22,900
Langlaagte Deep	19,950
Crown Deep	16,350
Glen Deep	15,200
Nourse Deep	14,850

Thus giving a total of £180,850 taken up these various deep level mines. In addition, the following sums have been commandeered: From the Robinson (£39,900), Sheba (£8572) and Jubilee (£4985), which brings the total value of all the gold seized, as far as is known up to the present, of £234,307. It is more than probable, when the particulars come to hand, that we shall find double the amount has been commandeered from these and other mines.

The directors of the Durban-Roodepoort Deep have issued an interim report for the fifteen months ended March 31, 1900. The mine was closed down on October 5, so that the report covers only nine working months. The estimated profit for this period was £39,660, and it is estimated that, after deducting costs incidental to the war, the company's cash and cash assets, as at the end of December, 1899, amounted to £25,747, inclusive of the cash seized by the South African Republic. Full details of working results are shown only for the six months ended June 30, though for the succeeding three months some particulars are furnished from incomplete returns. The total quantity of rock crushed in the first half of the year was 52,169 tons, and this yielded 20,923.3 fine ounces over the plates and 9555.9 ounces from cyanide works, giving a total result of 30,479.4 ounces, equal to 116 dwts. per ton. The value of the ore per ton was £2 8s. 9d., and after deducting working expenses the net profit per ton stood at 9s. 10d. The total quantity of ore crushed in July, August and September was about 26,609 tons, giving a total yield of 15,724.1 fine ounces, equal to 11.8 dwts. per ton. The working profit per ton during the latter three months is estimated at 12s. 9d. or, 2s. 11d. more than during the first half of the year. The mine was in good working condition when closed down, and the ore reserves are stated to have been very satisfactory.

At the outbreak of the war, in October, the total output of gold in the Transvaal for 1899 was 4,134,180 ounces, valued at £14,707,906. In consequence of the period covered by these figures not being a whole year, any comparison with the previous year's output would be misleading, but it may be stated that the actual output for the nine months—January to September—showed that the progressive annual increase in the gold production of the Witwatersrand was well maintained, and that, had there been no interruption in the work at the mines, the total this year would have considerably exceeded that of 1898. The total production of gold on the Rand since the commencement of mining operations amounts to 22,477,544 ounces, worth nearly $400,000,000. With British dominance will come increased development of the entire region.

Personal.

F. RAINVILLE is Supt. Federal M. Co., Columbia, Cal.

B. C. STANNARD is now Supt. Everett, Wash., smelter.

E. A. WILTSEE has returned to San Francisco from Denver.

W. S. ROTHERMEL is examining Camp McKinney, B. C., property.

J. R. CESSNA succeeds A. C. Purdy as Supt. Pinal, Arizona, M. Co.

C. D. AKERS is now Supt. Hidden Treasure mine, Centerville, Cal.

MGR. SALKLY has resigned at the Forman tunnel, near Willcox, Arizona.

J. M. ANDERSON is at Lardo, B. C., to take charge of the G. H. E. & D. Co.'s operations.

W. PELLEW HARVEY of the Tyre Copper Co. has returned from London to Vancouver, B. C.

F. F. SHARPLESS has resigned the superintendency of the Cal. Copper Co., Madera, Cal.

L. I. OGDEN is at Graniteville, Nevada Co., Cal., putting up a 20-stamp mill for the Erie M. Co.

J. G. HOPPER goes to London to form a stock company to operate the Soulsby mine, Soulsbyville, Cal.

R. S. MOORE of the Risdon Iron Works, San Francisco, has gone to Honolulu with a $100,000 pumping plant.

HERMAN C. BELLINGER has been appointed manager Montana Ore Purchasing Co.'s reduction works.

E. C. FENNER, Supt. Lowell & Arizona C. M. & S. Co., has returned from Sonora, Mexico, to Bisbee, Arizona.

V. Z. REED, who helped engineer the sale of Stratton's Independence to the

Venture corporation of London, has returned to Denver from a two-month's visit to London.

JAS. HICKEY will have charge of the new mining operations on the Comstock M. Co.'s property, Park City, Utah.

W. A. CLARK and F. Aug. Heinze of Montana have formed an alliance, offensive and defensive—an important coalition.

W. L. WATTS, Cal. State Mine Examiner, was last week examining prospective oil land at Del Mar, San Diego Co., Cal.

RALPH BAGGALEY and A. C. Kingsbury, mining men of Loomis, Wash., are viewing Calaveras county, Cal., mining properties.

F. O. SMOLT, formerly at Aspen, Colo., has purchased the assay office of W. F. French at Independence, Cripple Creek district, Colo.

E. W. WALTER has returned to Silverton, Colo., from Mexico, and will act as assayer and chemist for the Kendrick-Gelder Smelting Co. at Silverton.

H. A. CLAPP, president of the Rex Investment Co., Cripple Creek, Colo., has returned from Sonora, Mexico, where he is developing some mining properties.

W. S. KEYES of San Francisco is in Salt Lake City, Utah, in connection with mining litigation. He will be unable to attend the Milwaukee Mining Congress.

AUSTIN H. BROWN, formerly of Butte, Montana, has arrived at Redding, Cal., where he will have charge of Capt. De Lamar's Shasta Co. mining and smelting interests.

STEPHEN RAYMOND of Butte, Mont., is locally credited with a journey to Pilot Point, San Francisco bay, to superintend the construction of the Silver King M. Co.'s new smelter.

FORBES RICKARD of Denver, Colo., and Col. Wolnoralsky leave San Francisco next week for northwest Siberia, where the Venture Co. of London have secured a gold mining concession.

W. W. DAILY of London, Eng., and G. O. Bradley of Spokane, Wash., are in San Francisco in connection with their Fresno, Cal., copper property and their projected smelter near Martinez, Cal.

D. H. JACKSON, late of El Dorado Co., Cal., leaves San Francisco to-day on the San Jose for Cape Nome, representing the Russian syndicate that has concessions on the Siberian coast. A Russian man-of-war will meet him at Nome July 1st to convey him and party to the Siberian side, where extensive exploitation is contemplated.

A. H. BROOKS is in San Francisco preparing to collaborate with his colleague, F. C. Schrader. Both are members of the U. S. Geological Survey and have already made a preliminary government report on the Cape Nome country. They now go to the Copper river country. Mr. Brooks will meet Mr. Schrader at Seattle, Wash. They will spend 1901 in the Koyukuk country.

Commercial Paragraphs.

THE Empire Foundry, Marysville, Cal., is shipping a No. 5 hydraulic monitor, with appurtenances, to a gravel mine at Hoki Taka, New Zealand.

T. L. WILKINSON of Denver, Colo., is superintending the construction of an additional power plant for the Silver Lake mines and mill, near Silverton, Colo. It consists of a steam plant for the generation of electricity, the latter to operate motors at various points required at mine and mill.

THE Taylor Iron & Steel Co., High Bridge, N. J., is filling a large contract for steel wheels to be used on the sugar plantations in the Sandwich Islands. They will be shipped around Cape Horn to San Francisco and consigned to the Hawaiian Commercial & Sugar Co., Kahalui, Hawaii.

THE Ingersoll-Sergeant Drill Co., New York, had all its air compressors at the Paris Exposition erected and ready to run on the opening day, being the first American exhibitor to operate and the first exhibitor from any country to run its exhibit by steam. John J. Swann, late associate editor of Engineering News, is in charge of this exhibit.

JEANESVILLE IRON WORKS CO., Denver, Colo., A. Middlebrook manager, report contract from the Rialto L. & M. Co. for compound condensing pump, capacity 900 gallons per minute, 1000 feet high, fitted with Corliss steam valves for economy of fuel; stroke of pump 3 feet, condenser duplex pattern. They have also sold Bassick Mine Co. of Silver Cliff, Colo., duplex pump, 900-foot lift.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING MAY 22, 1900.

649,913.— EXPLOSIVE COMPOUND — S. Clark, Gold Hill, Ogn.
650,301.—PASTE BOTTLE—G. P. Cragin, Spokane, Wash.
650,302.—PASTE BOTTLE—G. P. Cragin, Spokane, Wash.
650,303.—GRATER—E. Crupe, S. F.
650,308.—CAMERA—T. J. Demorest, Garfield, Wash.
650,043.—RAZOR—F. W. Gotterke, S. F.
650,354.—ICE TANK FLOOR—Graham & Pierce, Sacramento, Cal.
650,147.—UNDER REAMER—E. A. Hardison, Santa Paula, Cal.
650,317.—DUMPING BARTER — E. A. Hardison, Santa Paula, Cal.
650,318.—CASING PERFORATOR — E. A. Hardison, Santa Paula, Cal.
650,077.—PIPE WRENCH—W. T. Hatten, Canyon City, Ogn.
650,320.—PUZZLE MAP—W. Hepfinger, Montesano, Wash.
650,148.—SKIRT SUPPORTER—W. Hill, Los Angeles, Cal.
650,046.—INKSTAND—P. D. Horton, Oakland, Cal.
650,323.—BUBBLE BLOWER—P. D. Horton, Oakland, Cal.
650,324.—BUBBLE BLOWER—P. D. Horton, Oakland, Cal.
650,263.—CYLINDER COCK—L. M. Morrow, Wasco, Ogn.
650,081.—FENDER FOR CULTIVATORS—W. P. Murphy, San Jose, Cal.
649,946.—SAWMILL CARRIAGE—H. Newton, Centralia, Wash.
650,083.—WATER HEATER—Pattison & Barlow, San Luis Obispo, Cal.
650,114.—REMOVING SURPLUS METAL FROM COATED ARTICLES—G. Porter, S. F.
650,138.—CONCENTRATOR—C. A. Smith, Los Angeles, Cal.
650,283.—LOGGING MACHINE — E. Turney, Los Angeles, Cal.
650,057. — ELECTRIC CIRCUIT CONTROLLER—A. L. Waters, S. F.
650,286.—ROTARY ENGINE—W. W. Watkins, Yuma, Ariz.
650,070.—CRIBBAGE BOARD — R. Whitman, Oakland, Cal.
650,289.—SOLDERING MACHINE—Winsor & Smith, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

APPARATUS FOR REMOVING SURPLUS METAL FROM COATED ARTICLES.—George Porter, San Francisco, Cal. No. 650,114. Dated May 27, 1900. This invention relates to an apparatus which is designed for the cleansing and preparation of nails which have been previously coated with molten zinc or equivalent protecting metal and which process is technically called "galvanizing." The object of the invention is to provide a mechanism and apparatus by which the surplus fused metal adhering to the nails can be cleaned off and the nails left in a smooth and merchantable condition. It comprises a cooling chamber with beaters, an inclined revoluble spirally ribbed cylinder and a directing board by which the articles are delivered from the first chamber to the cylinder, a shaking separating screen upon which the articles and separated particles are received, a collecting floor and discharge for the metal beneath the screen, a second screen upon which the nails are delivered, and an air blast and spraying device for cooling them as they pass over the second screen to the point of delivery.

DRYING APPARATUS.—C. R. Splivalo, San Francisco. Cal. No. 649,648. Dated May 15, 1900. This invention is designed for purposes of drying alimentary pastes, such as macaroni, vermicelli and the like. It consists of a vertically journaled and stepped center post, bars secured across the post at top and bottom and at right angles with each other, exterior frames fixed to the ends of the bars united at the corners to form rectangles, with vertical connecting bars, horizontal supporting bars secured thereto and trays adapted to contain the material to be dried, said trays being supported upon the horizontal bars and having their inner and overlapping spaced bars at the center of the structure which support these overlapping ends. Suitable mechanism is provided by which the structure is revolved upon its vertical axis so that the trays are constantly moved through the air in horizontal planes, and this continually furnishes sufficient dry air to take up the moisture and carry it outward away from the trays.

Recently Declared Mining Dividends.

Southern Boy Co., Colorado, 2½ cents per share	June 10
Osceola M. Co., Michigan, $3 per share	June 22
Boston & Montana Co., regular quarterly dividend $5 per share, extra—the largest dividend at one time by the Boston & Montana, calling for a disbursement of $1,500,000; total dividends to date aggregate $17,225,000	May 29
Home M. Co., Colorado, $25,000	June 1
Lake City L. Co., Cripple Creek, Colo., 7½ cents per share, $3785	May 31

"Extraction Was Satisfactory and Rapid."

THE PENNSYLVANIA MINING & MILLING CO.—MANAGER'S OFFICE.
BOULDER, COLO., April 25, 1900.

The Pneumatic Cyanide Process Co., 306 Boston Building, Denver, Colo. GENTLEMEN—We have now completed the large 16-foot tank, which we put in according to your plans. We have made numerous tests, which we have found to be satisfactory. On the last run made, we put the tailings, or ore, in the vat to the depth of 4 feet, making about thirty-two tons. We found that the air worked very well, distributing over the surface evenly, and that the extraction was satisfactory and rapid, doing in seven hours what it formerly took from forty-eight to ninety-six hours to do.

Yours truly,
THE PENNSYLVANIA M. & M. CO.
By B. R. Petrikin, Mgr.

Latest Market Reports.

SAN FRANCISCO, May 31, 1900.

SILVER—Per oz., Troy: London, 27⅝d (standard ounce, 925 fine); New York, bar silver, 60c (1000 fine); San Francisco, 60c; Mexican dollars, 49½c.

COPPER.—New York: Lake, 1 to 3 casks, 16.50 cash; carload lots, 16.25; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.00; Casting, 1 to 3 casks, 16.12½; carload lots, 16.00. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $3.97½; Salt Lake City, 3.90; St. Louis, $3.95; San Francisco $4.90, carload lots, 5c 1000 to 4000 lbs.; pipe 7, sheet 8, bar 6c. London, £16 17s 6d = 3.67½c per lb.

The schedule of prices issued by the American Smelting & Refining Co. is as follows:

Delivered.	Desilverized.	Corroding.
St. Louis	$3 95	$4 05
Chicago	3 95	4 05
Cincinnati	4 00	4 10
Pittsburg	4 05	4 15
Philadelphia	4 05	4 15
New York	4 00	4 15
Boston	4 07½	4 17½

SPELTER. — New York, $4.45; St. Louis, $4.55; San Francisco, ton lots, 6c; 100-lb lots, 6c.

ANTIMONY. — New York, 10c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

BABBITT METAL.— San Francisco, No. 1, 10c.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 40@45c ℔ lb.

IRON. — Pittsburg, pig, No. 2, foundry, $21.50; gray forge, $20.00; San Francisco, bar, per lb., 3c.

STEEL. — Billets, Pittsburg, $29.50; sheet bars, $34; San Francisco, bar, 11c to 18c per lb.

QUICKSILVER. — New York, $51.00; London, £9 10s; San Francisco, local, $51.00 ℔ flask of 76½ lbs. Export rates withdrawn.

BISMUTH.—New York, ℔ lb., $1.70 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.— San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

SOLDER. — Half-and-half, 100-lb. lots, 20½c; San Francisco, Plumbers', 100-lb. lots, 17c.

TIN.—New York, pig, $28.75; San Francisco, ton lots, 31½c; 1000 lbs., 32c; 500 lbs., 33c; less, 34c; bar tin, ℔ lb, 37c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ℔ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 33@35c ℔ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 66% B, 2c ℔ lb.; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2¾c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 31, 1900.

9:30 A. M. SESSION.

500 Bullion	03c	100 Ophir	54c
200 Chollar	25c	1000 Potosi	24c
50 G. & C	14c	200 Savage	13c
100 Ophir	55c	100 Silver Hill	33c

2:30 P. M. SESSION.

400 G. & C	13c	50 Potosi	21c
400 B. & B	26c	200 Utah	08c
50 C. C.& V.	$1 40	200 Overman	19c
1000 Savage	13c	200 Justice	09c
200 Chollar	23c	100 Silver Hill	35c
400 Potosi	22c	200 Bullion	03c

PRACTICAL CYANIDE OPERATOR, with three years' experience in superintending and operating cyanide plants, desires position. Also ASSAYER and AMALGAMATOR. References furnished. Address C. F., care this office.

Situation Wanted by a Millman.
Twenty-two years' experience in California, Mexico, and Central America. Best of references. Address W. S., this office.

For Sale---One 25 H. P. Hercules Gas Engine.
In first-class order. For particulars, apply by mail to JERRY J. SULLIVAN, Supt. Pioneer Gold Mining Company, Towle. Placer Co., Cal.

FOR SALE---QUICKSILVER,
In Quantities to Suit the Purchaser.
Direct from mine. H. P. DURRELL, El Paso, Texas.

RICH DRIFT MINE
IN PLACER COUNTY.
Wanted, parties with capital to purchase an interest in a large rich gold mine. Address H. H., Mining and Scientific Press, San Francisco.

WANTED.
A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.
Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

This Paper Fifty-Two Times, POST PAID, $3.00

WANTED.

Wanted,

Reliable parties to join other reliable parties in a fine quartz prospect. References exchanged. Address A. F., this office.

WANTED,
A Developed Copper Property.

A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.

H. E. RUNKLE, Mining Broker, El Paso, Texas.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75 00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Robert Hill, in the Gardner's Point Mine, near Port Wine, Sierra Co., to deposit tailings in Saw Mill Ravine; from Chas. Hilton, in the Dry Gulch Placer Mine, near Pleasant Valley, El Dorado Co., to deposit tailings in Clear Creek; from L. Foss, in the Woodchuck Mine, in Gold Lake Mining District, Sierra Co., to deposit tailings in Woodchuck Ravine; and from the Golden Hill Mining Co., in the Golden Hill Mine, near Powellton, Butte Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on June 11, 1900, at 1:30 P. M.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the National Cons. Mining Company will be held at the office of the company, 773 Mission St., San Francisco, California, on MONDAY, the 4th day of June, 1900, at the hour of 8 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting.

GEO. W. FLEISSNER, Secretary.
Office—773 Mission St., San Francisco, California.

Atlin Gold Fields,

British Columbia. Of particular interest to HYDRAULIC OPERATORS and experienced QUARTZ PROSPECTORS. American miners can pre-empt claims. For further particulars write BROWNLEE & LOWRY, Civil and Hydraulic Engineers and Land Surveyors, Atlin, British Columbia.

ALVIN PHILLIPS & CO.,

Chemists, Mining and Metallurgical Engineers,

1761 MARKET STREET,

DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

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The Eureka Company,
OF SAN FRANCISCO.

ROOM 1, - - 320 SANSOME STREET, SAN FRANCISCO.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

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SCIENTIFIC PATENT PRESS AGENCY
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Mill Plans, Cyanide, Concentration, Smelting, Sampling.
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Mechanical Engineer,
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CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

SITUATIONS WANTED.

COMPETENT CYANIDE MAN AND ASSAYER open for engagement. Best of references. Also an experienced AMALGAMATOR. Address "South," care Mining and Scientific Press.

WANTED—POSITION AS SUPERINTENDENT HYDRAULIC MINING PROPERTY. Thoroughly qualified in all its branches. Over twenty years' experience. References. Address "Mining Superintendent," care this office.

WANTED.—Position as superintendent, or to take charge, by a thorough practical miner and mechanic of eleven years' experience. Good draughtsman. Opening up new properties a specialty. Copper or gold mining preferred. Good references. Address B. C., care of Mining and Scientific Press.



12 H. P. $500

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FOR SALE.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.

For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

A Large Hydraulic Mining Property For Sale,

Comprising 274 acres and having water rights, ditches, reservoirs, etc. Ground has averaged for thousands of cubic yards of gravel over 22 cents per cubic yard. The property is offered for sale on favorable terms, for the closing of partnership affairs, and in consequence of the death of principal owners. There are no complications; U. S. patents for title. Facilities for restraining dams good; U. S. Debris Commission rights for dams granted. Every facility given for thorough investigation. For further particulars apply to ALMARIN B. PAUL, Agent for Eastern owners, 27 Crocker Building, San Francisco.

STEEL RAILS FOR SALE.

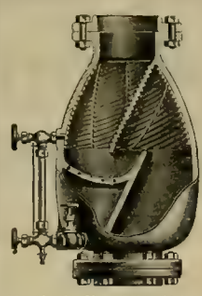
300 tons 30-lb. Relaying T Rails; 40 tons 25-lb. Relaying T Rails; 30 tons 20-lb. Relaying T Rails; 10 tons 12 and 16-lb. New T Rails. 1 Porter Saddle Tank, narrow gauge. Correspondence solicited.

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308 Market Street, San Francisco, Cal.

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The cylinder of an engine corresponds with lung action and in some ways is afflicted with lung trouble. For instance, too much moisture in the steam cylinder will cause more trouble than a damp atmosphere to a consumptive.



Vertical. Sizes 1½ to 12 in.

AUSTIN Separators

Horizontal. Sizes 1½ to 12 in.

Are the proper medicine. They eliminate all moisture and ensure the greatest efficiency to the engine. Shipped on 30 days' trial to responsible parties anywhere in the United States and freight paid both ways if not satisfactory.

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ALL DESCRIPTIONS UP TO 50 INCHES.
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FULL INFORMATION BY MAIL.

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TRADE MARK

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

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For Best Satisfaction and Lowest Prices
—IN—
PERFORATED METALS
—AND—



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PLACE YOUR ORDERS WITH

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CHICAGO, ILL., U. S. A.

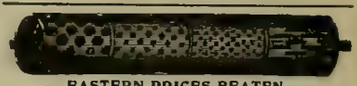
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A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.



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JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.
221 and 223 First Street, San Francisco, Cal.



QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F.

LARGE VARIETY.

Perforated Metal

THE ROBERT AITCHISON PERFORATED METAL CO.
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SUPERIOR WORK.

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Proprietors.

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★ ★ 222 Market Street, San Francisco, Cal. ★ ★

Manufacturers of All Classes of MINING MACHINERY.

COPPER AND LEAD-SILVER SMELTING PLANTS,

Latest Improved Water Jacket Furnaces,

CONVERTERS AND ROASTING FURNACES,

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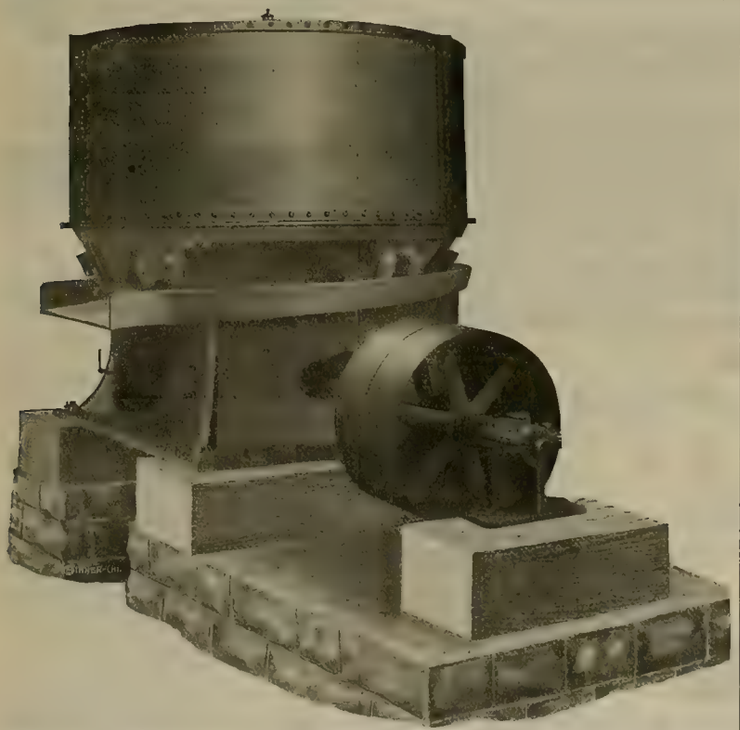
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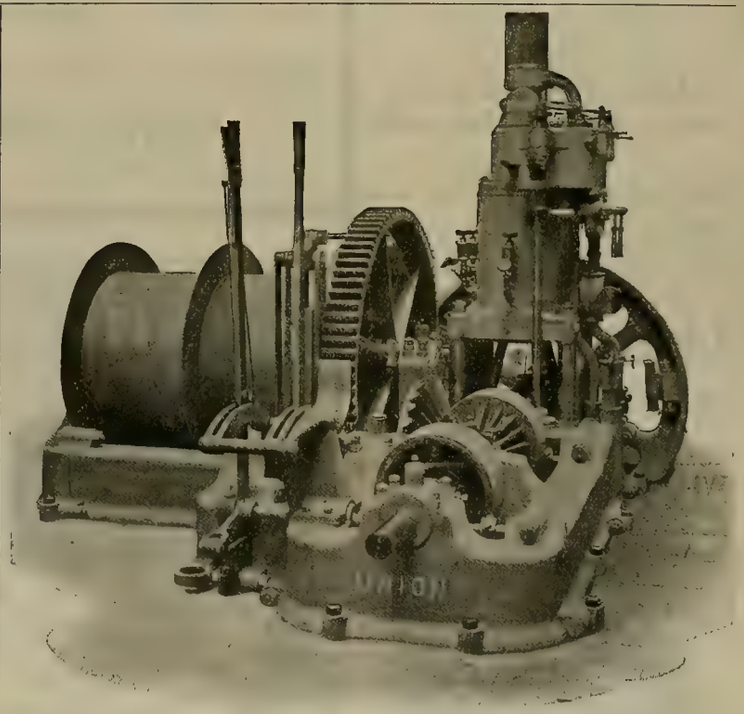
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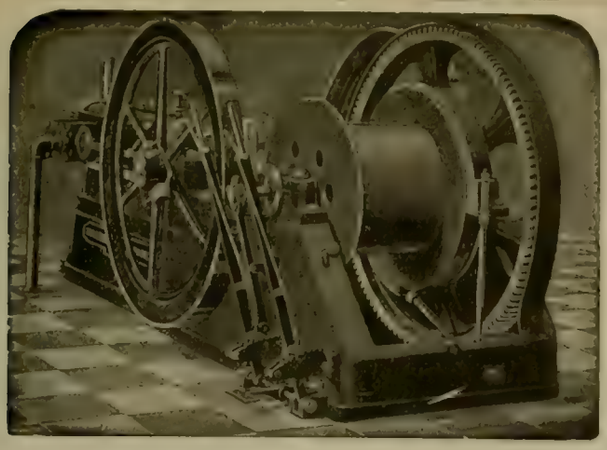
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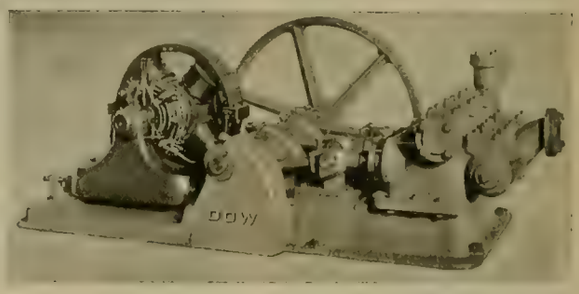
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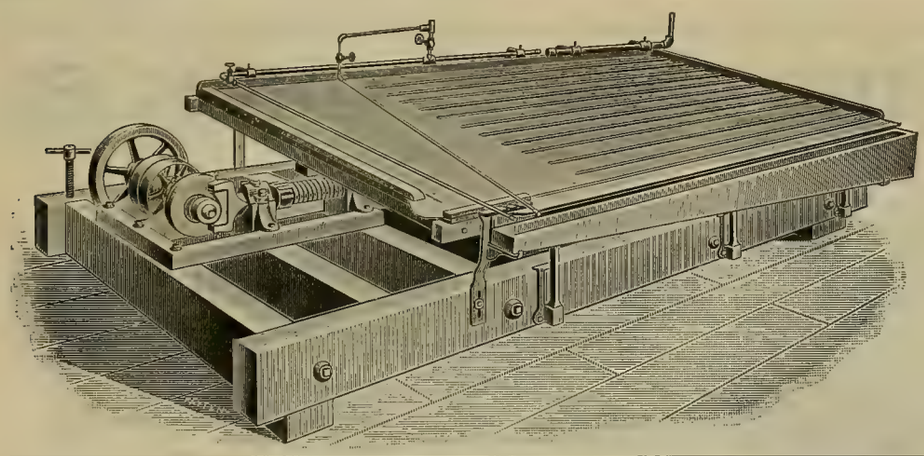
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Mines of Sultan Mountain, Colo.

With commendable and characteristic enterprise the Standard, of Silverton, San Juan Co., Colorado, has published a picture of Silverton and Sultan mountain, which is herewith reproduced. To such papers Colorado is largely indebted for its pre-eminence in gold production.

Time was when that region of Colorado was called "the silvery San Juan: it is now fitting to refer to it as the golden San Juan, for, though excelled and overshadowed by Cripple Creek district, yet that section of the State has contributed largely to Colorado's gold product.

Renewed interest is manifested in the section around Silverton by the present projects of the Sultan Mining & Smelting Co., which proposes to utilize the Animas river in generating electric power, a 5-mile flume, with a 400-foot head being contemplated to furnish 20,000 H.P. for local mine and mill use.

There are several properties that it is proposed to consolidate under one management, and work by modern methods; that is to carry on the business of producing gold as a business, intelligently and economically.

There are many active producing properties in the several districts of San Juan Co., at an altitude of from 10,000 to 14,000 feet. There are over 12 miles of aerial cableway. There are almost as many miles of tunnels and crosscuts, and the "staying" qualities of the deep mining carried on by the Empire Con. M. & M. Co., demonstrate the permanence of the ore. At Silver Lake, Gladstone, and other points in the county are important mines. The region is reached by the Denver & Rio Grande Ry. The mountain portrayed is 13,336 feet high.



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Boilers With Too Much Heating Surface.

An interesting illustration of the well-known fact that a boiler can have more heating surface than is good for it was cited recently by Dr. Coleman Sellers in a lecture before the Franklin Institute. When the first large engines and boilers for the water works of the city of Philadelphia were installed many years ago, it was found, upon test, that the boilers were insufficient for their purpose.

Oliver Evans, who had designed the engines, had specified the length of the grate bars and the width of the furnace to be used, as also the length of the boilers, which were of the plain cylinder type; but the wise men of the city government believed that they could do better by making the boilers much longer than he had suggested, and they were so constructed. Upon their failure to do the work, Oliver Evans was sent for in haste to correct the difficulty. His message to those in charge, enforced by his presence afterwards, was that they must cut off 10 feet from the length of each boiler.

This seemed a strange proceeding, but he soon explained to them that the extra length which they had added to his prescribed dimensions was acting as a condenser to reconvert steam into water, inasmuch as the heat of the furnace could not extend the whole length of the boilers as they had been built.

Upon cutting the boilers down to their proper size so the heat could extend over the whole fire surface, they proved sufficient for their work, and continued to operate as long as this primitive water was in existence. —Cassier's Magazine.

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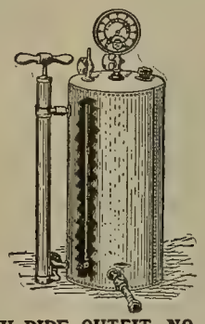
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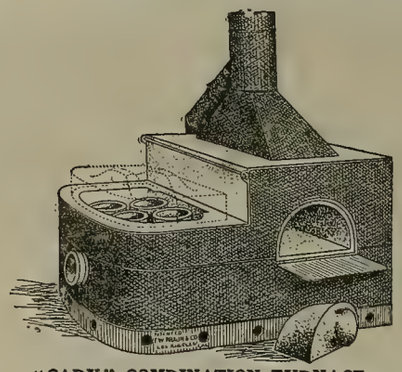
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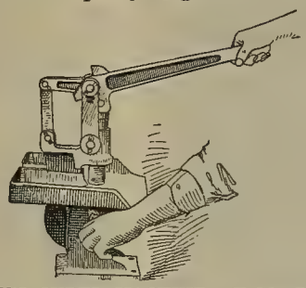
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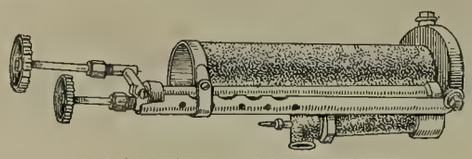
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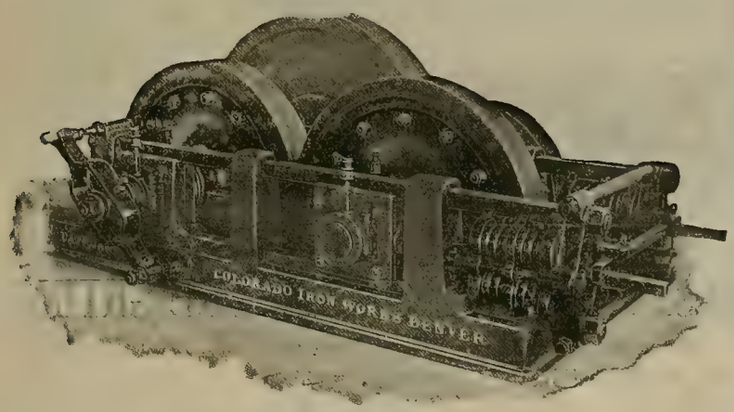


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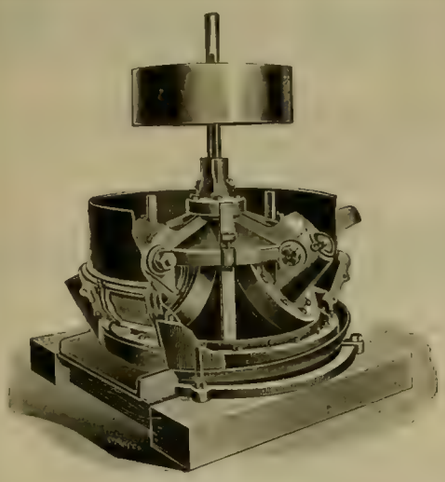
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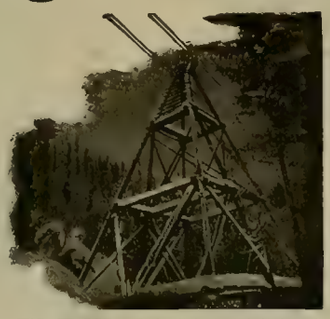
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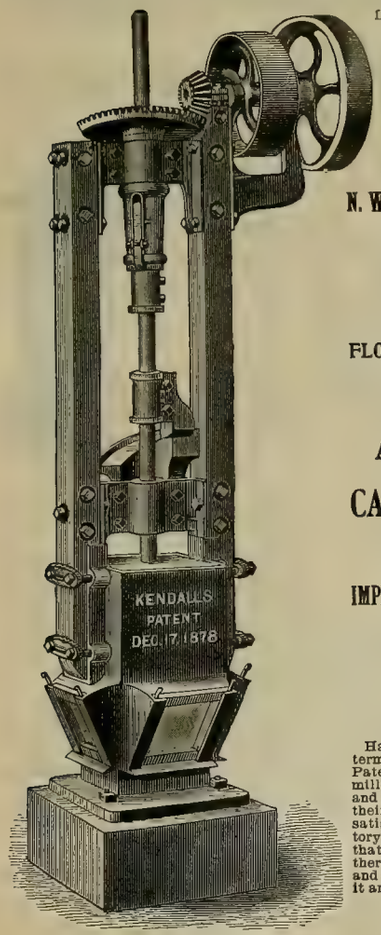


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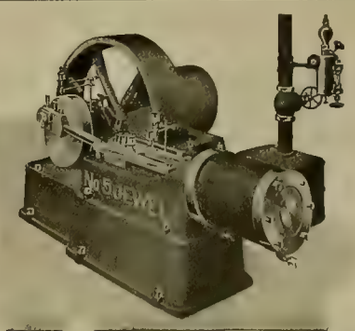
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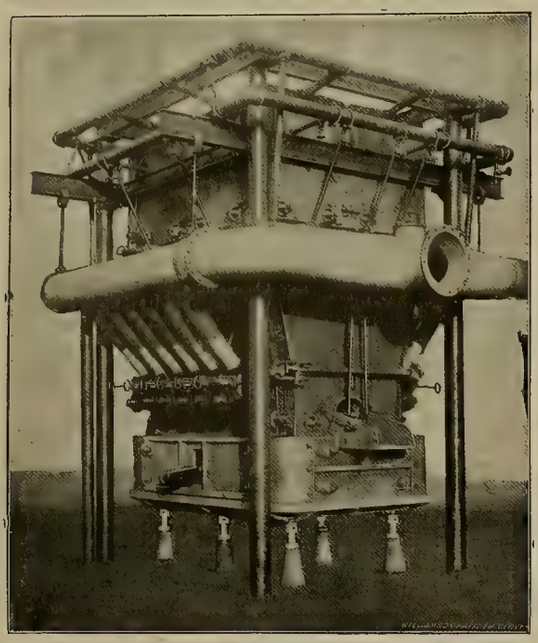
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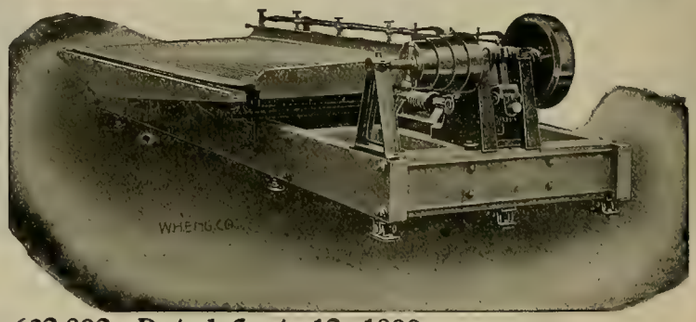
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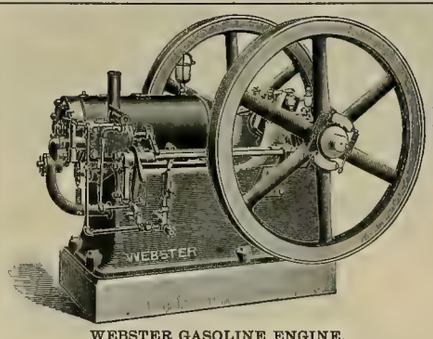
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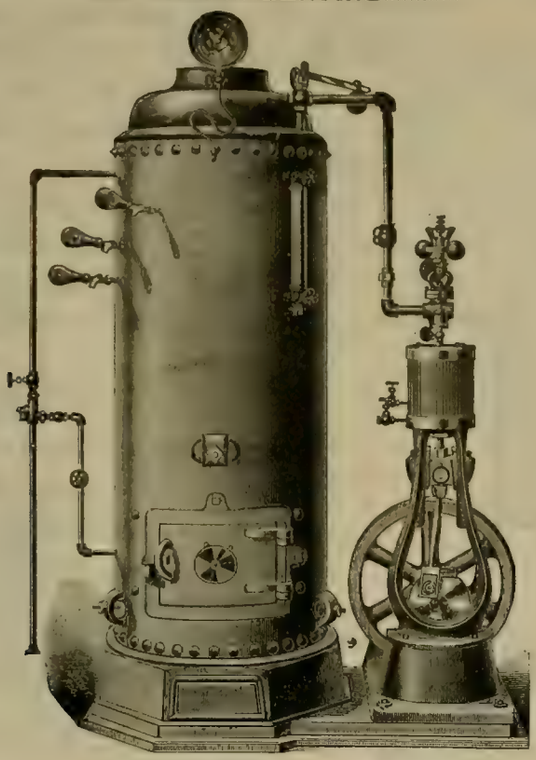
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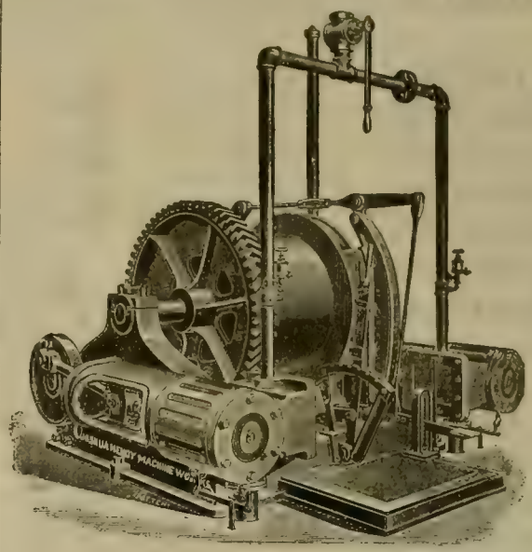
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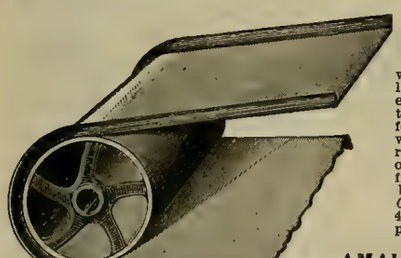
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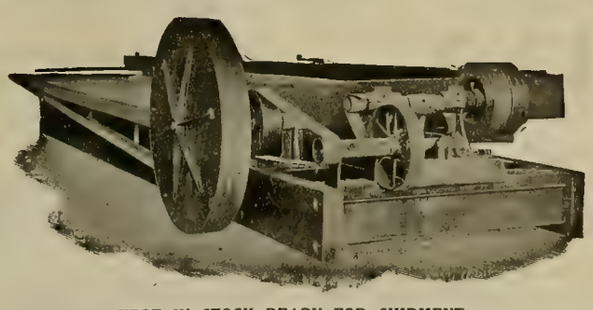
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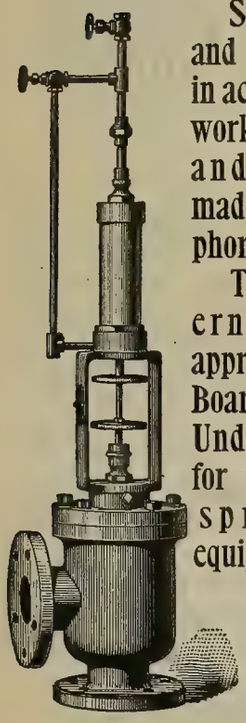
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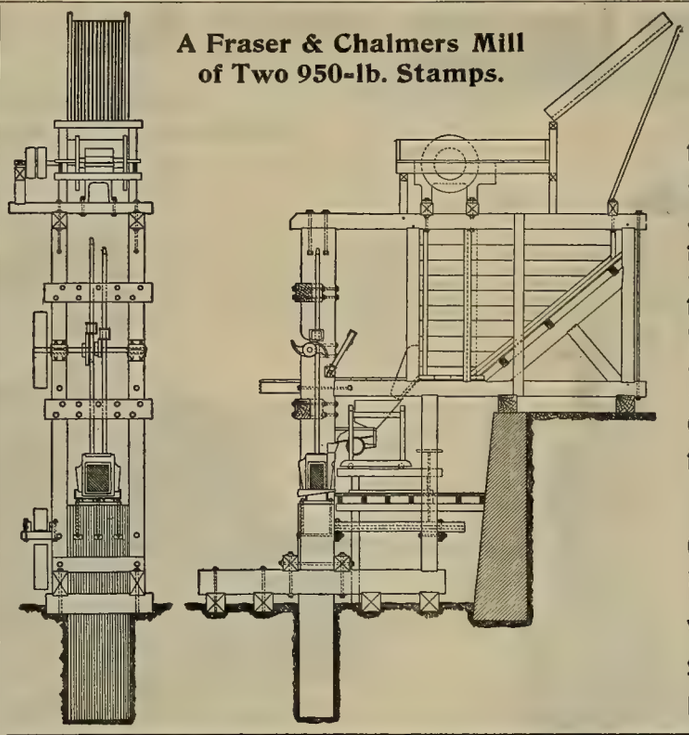
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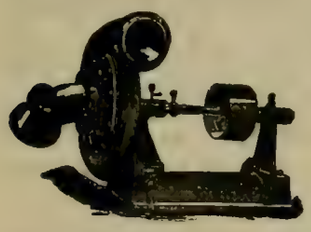
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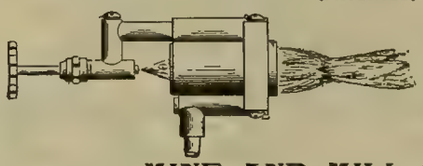
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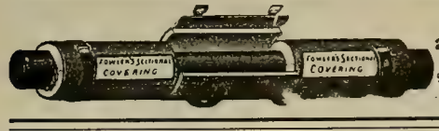
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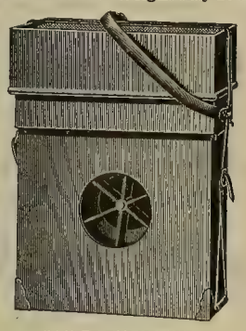
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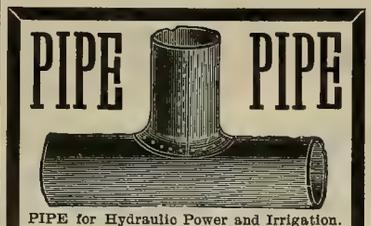
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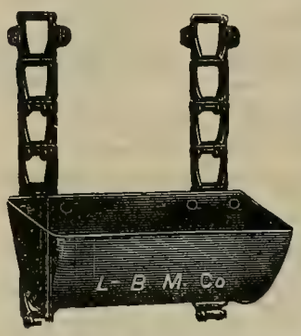
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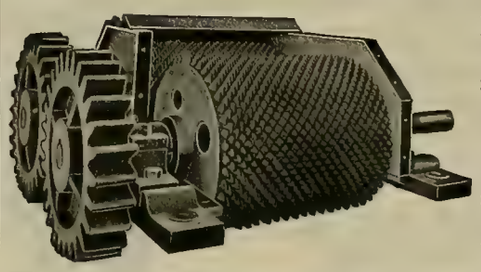
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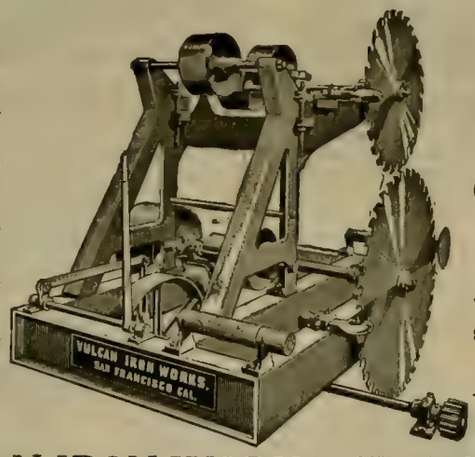
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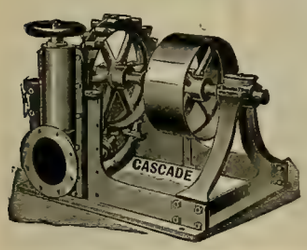
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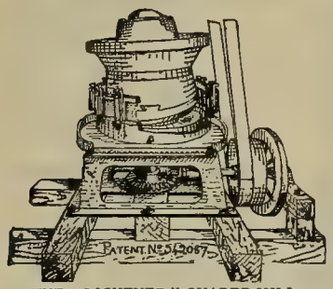
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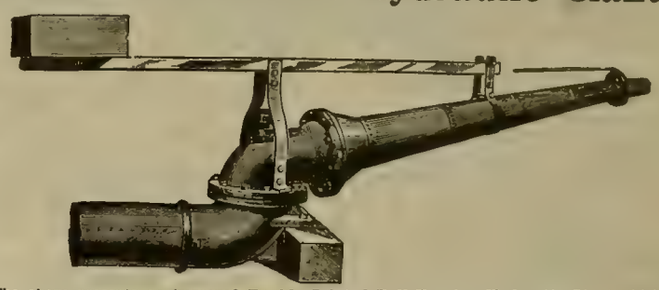
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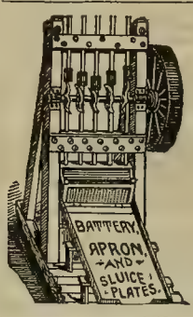
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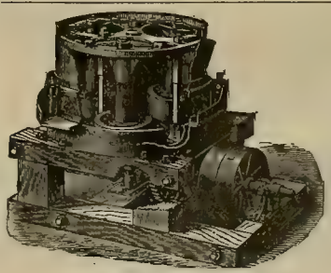
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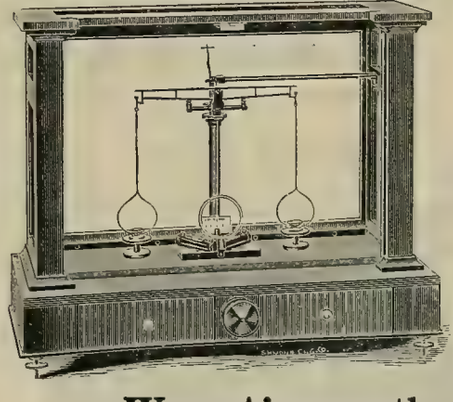
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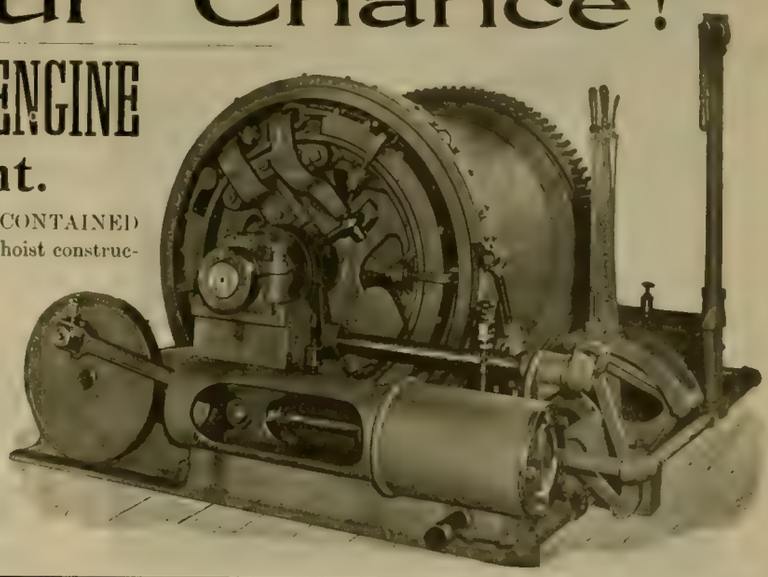
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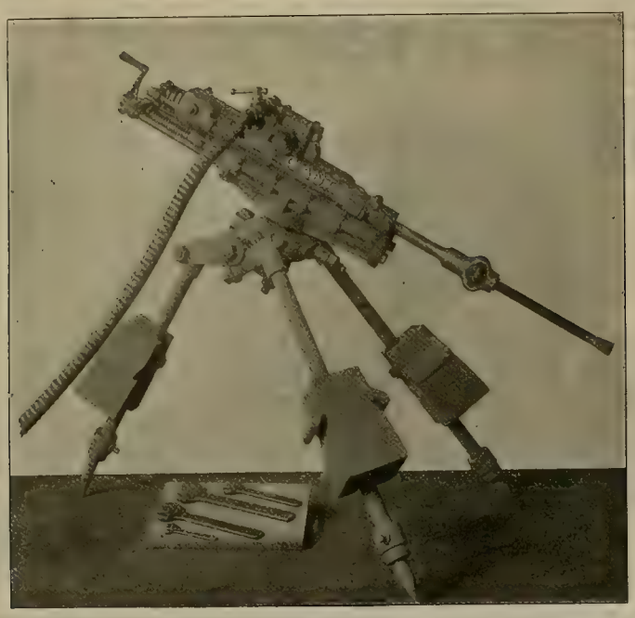
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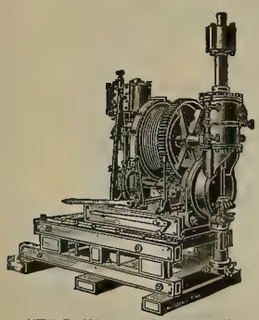


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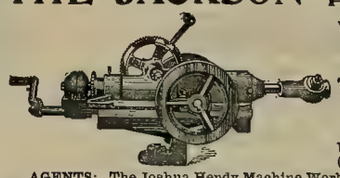
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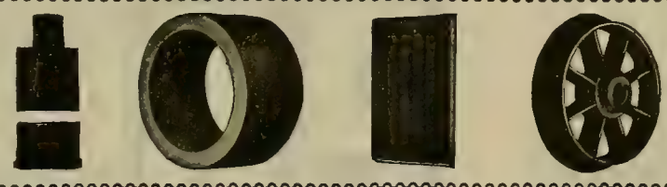
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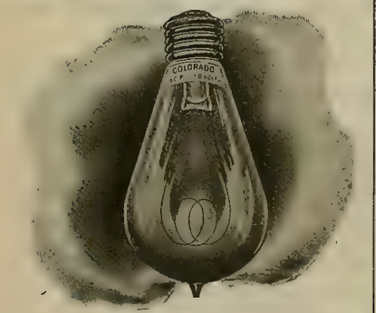


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ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of May, 1900, an assessment (No. 5) of ten (10c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 11th day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—213 Jackson street, San Francisco, Cal.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of May, 1900, an assessment (No. 3) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 310 Pine street, room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of July, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 30th day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—310 Pine street, rooms 36, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of May, 1900, an assessment (No. 25) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 21st day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 23) levied on the 2nd day of April, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. Heckmann, Trustee	64	2,000	$40 00
H. Heckmann, Trustee	65	2,000	40 00
H. Heckmann, Trustee	66	500	10 00
H. Heckmann, Trustee	67	500	10 00
H. Heckmann, Trustee	68	500	10 00
H. Heckmann, Trustee	70	200	4 00
H. Heckmann, Trustee	71	200	4 00
H. Heckmann, Trustee	72	200	4 00
H. Heckmann, Trustee	73	200	4 00
H. Heckmann, Trustee	79	10	20
P. A. Wagner, Trustee	90	980	19 60
William Dieffenbacker	84	190	3 80
William Dieffenbacker	98	200	4 00
William Dieffenbacker	99	200	4 00
William Dieffenbacker	100	200	4 00
William Dieffenbacker	101	200	4 00
William Dieffenbacker	102	100	2 00
William Dieffenbacker	103	100	2 00
G. A. Hinckelbein, Trustee	9	1,000	20 00
G. A. Hinckelbein, Trustee	10	1,000	20 00
G. A. Hinckelbein, Trustee	11	1,000	20 00
G. A. Hinckelbein, Trustee	24	500	10 00
G. A. Hinckelbein, Trustee	32	200	4 00

And in accordance with law, and an order from the Board of Directors, made on the 2nd day of April, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 28th day of May, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

POSTPONEMENT.

The day of sale of the above delinquent stock has been postponed to WEDNESDAY, June 27th, 1900, at the same hour and place. By order of the Board of Directors. CHAS. BOVONE, Secretary.

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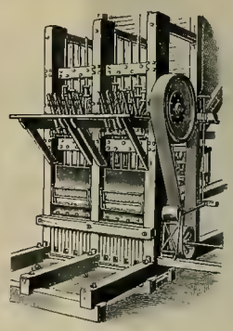
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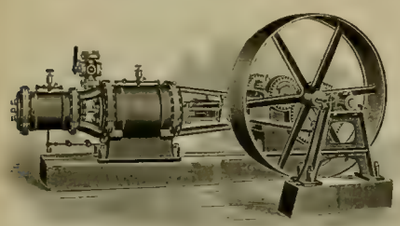
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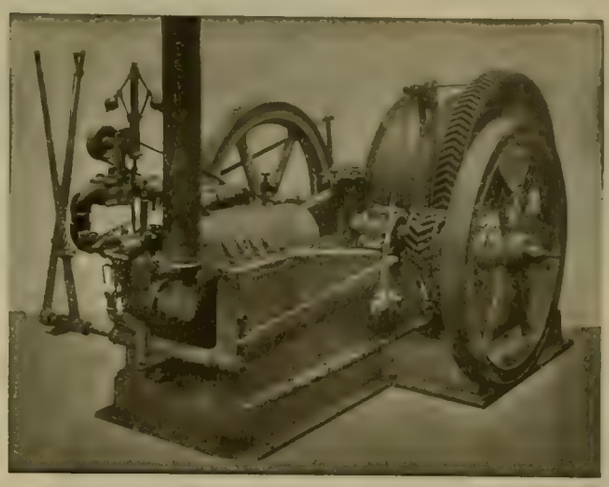
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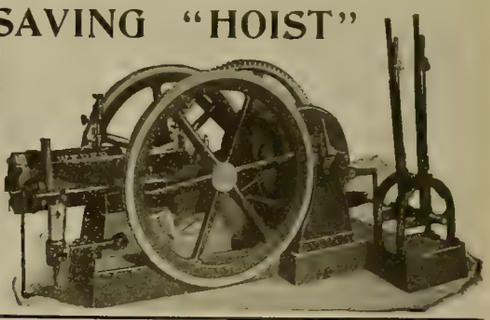


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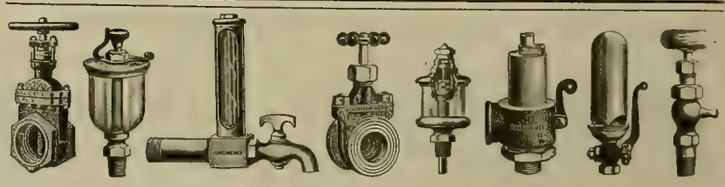
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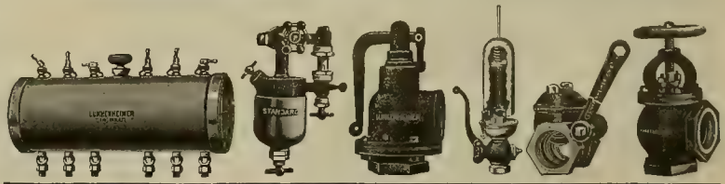


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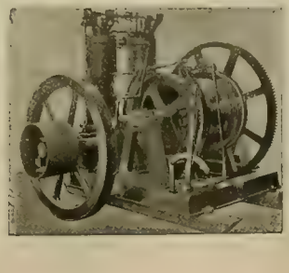


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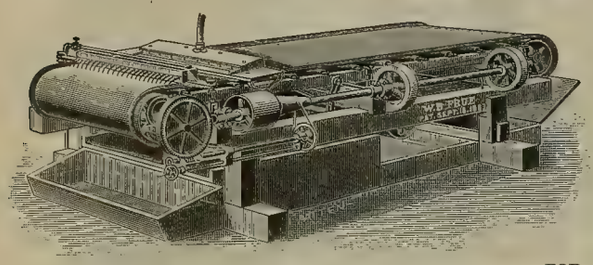
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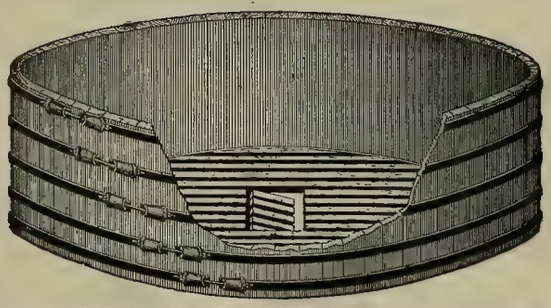
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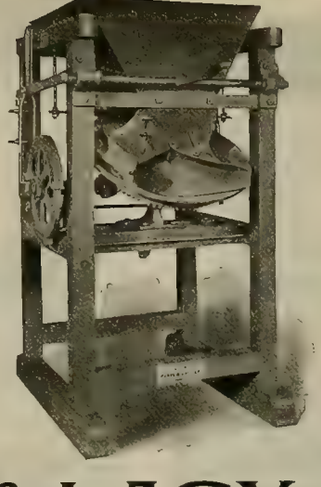
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The advantages of this ore feeder, over any others that are in the market, are, that the feed is positive and will not gig back no matter how slight the motion to the arm; it can not possibly spill ore of any character and will definitely measure out from one to fifty tons per day of any class of ore.

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Zinc Mining in Missouri.

On page 640 is an extended account of zinc mining now in progress in the vicinity of Joplin, Mo., illustrated on this page. The close of the South African war and the renewal of more active operations in the Transvaal mines means more market for zinc, as elsewhere, and the subject is of present interest. The origin of the zinc ore around Joplin is deemed due to differentiated solution by the agency of water. The zinc bodies follow channels traced out long ago by subterranean watercourses. The original formation was composed of limestone, chert or flint, and zinc, the zinc being mainly diffused throughout the limestone. By the water's action the limestone has been dissolved and the chert and zinc have fallen together, the surface of the earth undoubtedly sinking in the process sometimes to a depth of some hundred feet. The zinc sulphide, as left by the vanished limestone, sometimes occurs by itself in great purity, and in other cases is mixed with the chert in a brecciated formation. Often the action of the water can clearly be traced in cavern-like formations, leaving a vault-topped body of zinc enclosed by surrounding chert. The shape and extent of the ore bodies vary according to the course of the underground water. Sometimes there is a very thick and narrow vein vertically; again the zinc is spread in a wide, thin layer. Often such layers are superimposed in considerable number, with intervening strata of earth and chert. The ore itself is of remarkable richness, owing to the close concentration by the water's action. It assays in many of the Joplin mines as high as 60%. Two hundred feet is still considered "a deep shaft."



Old Tract at Carterville, Mo., With Caved Ground and Abandoned Shaft Houses.



Beasley Mill and Mine, Webb City, Mo., Showing Old Caved Ground in the Foreground.



Verns Mill, Prosperity, Mo., Showing Elevator and Launder for Tailings.



Prospecting Near Galena, Kansas.



Mohawk Mill, Mine Buildings and Dumps.

The Joplin Zinc District of Southwestern Missouri. (See page 640.)

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W. D. CURTIS.....223 W. Second St., Los Angeles, Cal.

San Francisco, June 9, 1900.

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Grubstaking.

The validity of that form of prospecting contract known as grubstaking has been repeatedly upheld by the courts. The word itself has no double meaning about it, and like most mining terms, indicates exactly what is intended—viz.: a partnership between those who furnish money and supplies to him who is thus enabled to look for and find mining prospects, each to share in the profits or successes as agreed. It isn't exactly a "partnership," it is a sort of venture, or adventure, where one furnishes the grub and stakes the other who supplies the sabe. Though the agreement is not required to be a written one, each party to it justly expects the other to do all that he agrees, and, usually, the responsibility ceases there. When the prospector locates a mine comes a question of tenancy in common, with all its attendant rights and responsibilities. If during the time agreed upon the prospector finds anything and locates it in his own name, his associate, the one who grubstaked him, can claim and enforce compliance with the terms of the agreement, not on the basis of a partnership, but according to the terms of the contract. If during the life of the contract the outfitter fails to keep his part of bargain such failure at once absolves the prospector from further observance of its provisions. And, at the same time, during the life of the contract, either of the two parties to it can buy or sell mining claims with his own money and at his own risk without the other having anything to do with it in any way.

All this applies to the grubstake, pure and simple. That is about as far as a grubstake contract usually goes. If a man is hired to get a mine, and is paid wages from the start, with a promise of a raise in his pay or an interest in what he may acquire, that is not a grubstake, and the relations between the two are those of employer or employe. Any agreement extending beyond discovery and location takes the grubstake contract into a different domain, and makes it more of a mining partnership. So far as property rights are concerned, in the ordinary grubstake contract both parties are merely tenants in common in whatever property may be acquired while the agreement was in force, and neither party has the right to bind the interest of the other.

There isn't much style about grubstaking, nor are there any frills on it; it is a homely proposition with plenty of hard work and a certain amount of old-fashioned honesty and integrity about it, a mutual risk in which each party gives the other a square deal, and neither is supposed to be trying to get the best of it. Some of the best mining property in the United States is the result of grubstaking a prospector, and in these days of scientific mining and metallurgy the prospector is as important a factor as ever, and grubstaking may well be as favorably considered as ever it was. Grubstaking is a good investment to-day; it was always a favorite form of procedure with mine operators always on the lookout for new properties, prospects susceptible of being made into mines—for mines are made just as any other manufacture—and deserves consideration. Not every prospector is fit to be grubstaked; not every man a prospector would care to take a grubstake from; yet there are many prospectors who, backed by coin, could make the venture one of mutual profit.

Second-Hand Machinery.

"What do you think of buying second-hand machinery?" is a question asked this week by a Denver inquirer, and one deemed worthy editorial note. As nothing in the inquiry is specific, the question being a general one, the answer will be equally so. Speaking abstractly, it is better not to buy second-hand machinery that is old and badly worn; so that, briefly, our advice would be, "Don't." But there are numerous qualifying attendants, and the subject deserves extended notice.

"Second-hand machinery" is a term susceptible of very wide and different meanings. As soon as a machine is set up or once used it is "second-hand." If in use twenty years it is still "second-hand." Much, too, depends on the kind of machine. There are machines made twenty years ago that are still worth using, but in the vast majority of cases the newer the style, the more recent the make, the better it is likely to be. Then, too, it depends greatly on what the machine is to do, for what purpose it is to be used. If it be in any department of mining, our advice would be most emphatically to buy no old second-hand machinery. As noted, the term is an elastic one; for a variety of reasons a man may have for sale a whole, complete modern mining plant that he bought last month, and installed last week, and only used three days. If our inquirer could get all or part of it that he wanted, and it would serve his purpose, at a price considerably less than it cost the first owner, it would be a good buy. If, on the contrary, he were proffered some wheezy old concern that had been usurping the place of a necessary modern piece of mechanism around the mine, for years, he would do well to refuse it as a gift. In this as in all things circumstances control and determine. One thing can be said with emphasis. The idea in all business purchases of machinery is economy—not stinginess or close dealing, but true economy, which is only another name for intelligent expenditure of money.

There has been great advance in machinery. In some big concerns the managers find it to-day economy to throw out machines costing $100,000 ten years ago, cast them if necessary into the scrap heap, and put in a new outfit, if they want to keep up with competing concerns who have up-to-date machinery, and who can consequently make their product for less and sell it for less than the establishment that has the old-style machine. This is real economy—to spend $100,000 if necessary rather than be forced out of business by up-to-date competitors. Big users of machinery no longer ask, "What is that man earning?" the question now is, "What is that machine earning?" and if it isn't earning what it ought it is thrown out. The man that buys such "second-hand" machinery may have special use for such abandoned mechanism—if not, he is not up-to-date himself.

In gold mining it is somewhat different. Miners have the advantage of manufacturers; they have no competition; a gold miner doesn't care whether the mine next to him is in bonanza or borasca so far as rivalry or market is concerned. It makes no difference to him whether the other mines in the district are producers or not; he gets just the same for his product. The gold miner has to study no markets, no freight rates, no acts of competitors. Hence, he can view the question of buying second-hand machinery from a safer standpoint, and can experiment a little. What would be fatal to a manufacturer would be a question for him to consider.

In conclusion, it may be said that as between a low price for an old machine and a high price for a new one, good economy would choose the new machine every time. It would be the cheapest in the end. "Cheap" is a relative term. A business man managing his business on sound lines can not afford to buy "cheap" things, for in the long run, or the short run, they prove to be the dearest.

Importance of Analytical Work.

The chemist is an important man these days in every large establishment where analysis of material is a necessary part of the mechanical routine, and the number of such establishments increases as the economy of such analysis is more understood. Time was when the chemist was looked upon as an expensive luxury, or as a theoretical enthusiast, tinkering with alembics and blowpipes, amusing himself in dilettante leisure. Now he is a hard-headed matter of fact business adjunct of manufactures.

What was once puzzling or deemed unavoidable is now made easy of solution. The work of the analytical chemist is now of the highest commercial value, creating new products and diminishing the cost of production. Every problem in chemistry has essential relation with public utility, with the advance of general wealth. The field is so broad, the amount of unoccupied ground so great, the opportunities so abundant, that, in whatever lines the analyst's tastes suggest or force of circumstances leads him, he finds something worth doing and which, well done, leads to honor and profit.

The theoretical chemist may think that his work is on a higher and nobler plane than that of the patient analyst who constantly keeps in view the commercial aspect of the work, but so that the work be congenial there is enough domain of chemical science for willing workers in every field.

The chief charm in analytical chemistry is its power to explain difficulties, to make clear the why of much that is mystifying in daily practice. The old rule was that when anything went wrong the weak line in the chain of circumstances was hard to find. Now in ordinary manufacture the analytical chemist can quickly find and correct the cause of failure in the desired result.

Mr. C. B. Dudley illustrates this ability of an analysis to explain difficulties. In a big factory was received about fifty sheets boiler plate, two of which gave difficulty in flanging—in bending over the edges of the sheets while hot, nearly at right angles to the balance of the sheet, to enable it to be joined to other sheets in the boiler. The two sheets cracked in the bend, the other forty-eight worked all right. The workmen were proficient, the shop practice was good, and the cause of the failure in the two sheets was not apparent. The analytical chemist analyzed samples from each of the two sheets and found they showed 0.35% and 0.36% of carbon, respectively, while analyses of samples from other sheets in the lot of fifty showed in no case above 0.12% to 0.15% carbon, giving immediate explanation. The shop had long been supplied with the softer grade of steel and the shop practice was applicable to that kind of steel. Naturally with the harder grade difficulty arose, continuance of which analysis made unnecessary.

THE American Steel & Wire Co. has cut loose from the Federal Steel Co., and will soon be in position to supply its own raw material. The former had contracted to take about 3000 tons per day of billets and rods at present loss, and some time ago offered to pay the Federal Steel Co. $5 per ton on undelivered material to be released from the contract, which has till Sept. 1st, 1900, to run. The offer was refused, whereupon the combine completed arrangements to cease paying toll to its big brother trust, and after the date named will be independent of such arrangements by securing the ore, the smelters and the manufacture of rods and billets for itself. From Jan. 1st, 1899, to April 1st, 1900, the American Steel & Wire Co. earned nearly $17,000,000 net, and can stand a little depletion.

THE price of lead is not likely to recede further. The steady demand and consumption warrant sustaining the price apart from stock speculation and the variable nature of trust management. The question is of prime importance to Cœur d'Alene, Utah and British Columbia miners.

Concentrates.

A COMPLETE technical description of the bromine extraction process appeared in the issue of Feb. 10, '98.

THE greatest depth ever attained on the Comstock, Nevada, was in the North End, in the Union Con.—3350 feet in 1883.

DOUBLING the diameter of a pipe increases its capacity four times. Friction of liquid in pipes increases as the square of the velocity.

THE land department has no jurisdiction to correct an alleged erroneous survey of a patented placer claim, while the patent is outstanding, so as to include land not applied for or surveyed.

IN case of an attack on a mineral location of land that has once been adjudged mineral in character, the abandonment or forfeiture of the claim must be shown by clear and unmistakable evidence.

IF the matter in the earth's crust be represented by 1000, oxygen would equal 480 parts thereof, silicon 290, aluminum 80, iron 60, calcium 30, magnesium 20, sodium 20, potassium 15, hydrogen 2, other elements 3.

NO ONE was ever saved by faith in the mining stock market, whatever effect it may have had regarding salvation. In the stock market, however, many a one has been saved by want of faith. The conditions are different.

MILLSITES are not mineral entries. On the contrary, the land entered must be shown to be non-mineral. They are merely auxiliary to the working of mining claims. The owner of a patented lode may by an independent application secure a millsite.

TO FIND the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434. Approximately, every foot elevation is equal to one-half pound pressure per square inch. This allows for ordinary friction.

IN the chlorination process the more copper in the ore the greater the consumption of chemicals. Where pyrites are copper-bearing forty to fifty pounds bleach and that equivalent amount of sulphuric acid may be required, while where clean iron pyrites are treated only ten or fifteen pounds are necessary.

THE mean pressure of the atmosphere at tide level is usually estimated at 14.7 lbs. per square inch, so that with a perfect vacuum it will sustain a column of mercury 29.9 inches, or a column of water 33.9 feet high. In ordinary practice pumps should be placed not over 20 feet above water supply, nearer where possible.

CRYSTALS form in cold weather in an indicator bottle in a chlorination plant in which chlorine is generated by sulphuric acid and chloride of lime in vats apart from those used for solution. An increased temperature causes them to liquefy, volatilize, give off chlorine and leave no residue. These crystals may be presumably regarded as chlorine hydrate.

AS TO economy of fuel, the horizontal tubular boiler is subject to the same rule as other boilers. Maximum economy may be obtained from it if the furnace be of a kind which will burn the coal thoroughly, if the extent of heating surface be sufficient for the amount of coal burned, and if the passages through the flues are so restricted in area that the gases traverse the upper and lower rows with approximately the same velocity. Its chief merit is its low first cost.

TO FIND the horse power necessary to elevate water to a given height, multiply the number of gallons per minute by 8.35, weight of one gallon, and this result by total number of feet the water is to be raised (that is, from surface of the water to the highest point to which the water is raised), and you have the power in foot pounds. Divide by 33,000 and you have the horse power. One horse power is equal to about five men. To the theoretical power a liberal allowance for friction, etc., should always be added.

IF the barometer stands 30 inches at the mouth of an 1800-foot shaft it will be 32.14 inches at the bottom. If its reading be 30 inches at sea level, it will be 17.2346 inches at a height of 20,000 feet. Were it possible to have a shaft 20,000 feet deep the barometer at the bottom would read 115.71 inches, or about 8 atmospheres. By following this out one could tell by an accurate barometer in a mountainous region how far above or below the level of the sea the top or bottom of a shaft was, provided the depth of the shaft were known.

THE undercurrent is a large, shallow kind of sluice, from 20 to 50 feet wide and 40 to 50 feet long, with sides 16 inches high, set on a heavy grade at the side of and a little below the main sluice, the design of it being to relieve the latter of the finer material and permit of its handling the remainder more effectually. This structure is located at a point where the grade is too spare for a drop in the main sluice, across which there is here set an iron grating. Through this grating the finer material drops into a box paved with blocks and set at right angles to the main line of sluice; the coarser stuff which passes over the grating being picked up by the sluices set on a lower level, the box meantime discharging its contents through a chute into the undercurrent. This chute, which is paved with cobbles and set with dividers of wood whereby the flow is distributed evenly over the undercurrent, has a 2% to 3% grade and narrows toward its lower end. The undercurrent, the bottom of which is made of 1½-inch plank, tongued and grooved, is set on an 8% to 10% grade. It is paved with cobbles or small blocks. The gravel escaping from the undercurrent is caught in a side sluice and returned to the main line. Formerly a sort of subsidiary undercurrent, set beside and below the principal structure, was in use, but they have been discarded in recent practice. A sluice head of water is a constant flow of one cubic foot per second, equal to 40 miner's inches. One sluice head of water falling 8.8 feet is equal to one theoretical H. P.

TO FIND the capacity of any single-acting cylinder, square the diameter (in inches) by the cylinder, multiply this by .7854, and the result (which is the area of the circle of cylinder) by the length of stroke in inches. This gives the capacity of cubic inches per stroke. Multiply this by the number of strokes per minute, and divide the product by 231 (the number of cubic inches in a gallon of water). The result will be the capacity, or gallons of water, the cylinder will discharge per minute. A two-cylinder or double-acting cylinder has double the capacity of a single-acting cylinder.

SULPHIDE ORES carrying 2% to 10% of pyrites which would not give more than 20% extraction of the gold in the raw state will often give 85% to 95% after a dead roast and treatment with cyanide. In mines where the oxidized and sulphide ores are mixed, especially from the surface workings, it is often the case that these ores are acid, and it is economy to roast the mixed ores, thereby putting the gold in the sulphide ores in condition to be easily extracted and often saving a higher percentage of gold from the part that was originally oxidized, besides destroying the acid quality the ores originally had before roasting.

IN hydraulic mining the cubic yard is generally taken as the unit of measurement for work, and when applied to the valuation of a claim is considered to refer to the total contents of the volume of material between the rim rock from the surface to bedrock on the line of deposit. When the statement is made that a hydraulic mine will yield so much or so little gold per cubic yard, hydraulic miners do not understand that as asserting that in the gold gravel designated there is the stated quantity of gold in each and every cubic yard, but that that is the estimated or stated amount to the cubic yard as a general average of the entire contents of the ground in question.

A ZINC–LEAD ORE containing copper should find no difficulty in securing smelter treatment in Colorado, Utah or California. In the former State it may be successfully treated at Canyon City or Leadville; in Utah, the Hanauer smelter at Salt Lake; in California, the Selby Smelting & Lead Co., Vallejo. The treatment charge would necessarily depend on the character of the ore. That and freight charges would determine the profit or loss of shipment. Were there iron and lime in the ore a smelter could do better than if it were siliceous. So many factors enter into the problem that it is difficult to more than generalize. Better address your nearest smelter, sending fair sample of the ore.

THE water level in a boiler may be judged from the mean of the water surge in the water gauge. If gauge cocks only are used, the approximate water level may be judged from the manner of opening the gauge cocks. By slightly opening the gauge cocks one after the other, one may obtain clear steam from the upper gauge, a drizzle of water and steam from the middle gage and more solid water from the lower gauge, when the mean height is between the middle and lower gauge, with variations suitable to high or low water. A boiler may foam from excessive use of steam or from foul water, or want of cleaning. An engineer should always be able to judge whether the boiler is too small for its work or whether dirty water and want of cleaning is the cause of foaming.

THERE is no such thing as a perfect solid. Certain conditions of pressure will cause any rock to flow, and, when strained beyond a certain point, they become deformed first, while a continuation of the strain causes rupture. Shearing is the motion of a rock along lines of maximum longitudinal strain. The same force may have different effects upon a rock, depending on the degree with which it is applied and the toughness of the rock. When there is but little difference between the limits of solidity and the ultimate strength of a substance, it is said to be brittle. A strain which, when exerted on a brittle rock, shatters it, will, when applied to a tough rock, cause a clean cut. The more rigid rocks transmit any compressing strain better than those that yield readily. A tangential thrust on stratified rocks is transmitted in the direction of the strata in different degrees, according to the inflexibility of each stratum. As soon as a bend takes place the force is split up into one tangential and the other radial. The radial component tends to raise or depress the stratum according as it is directed upward or downward. A lateral thrust on a rigid body tends to form a series of overlap faults, and if the face be continued the faults show a tendency to ride forward en masse over the less disturbed beds.

TO FIND if a certain low-grade gold or silver ore is susceptible of profitable concentration, take a weighed quantity of the dry pulverized ore passed through a 40-mesh screen, such as would be a fair average sample of the bulk of ore treated, say, one pound, after having previously assayed the sample. Pan this quantity carefully into a second pan, and repan until all the sulphurets are separated from the gangue, then dry and weigh the sulphurets and assay them. The weight represents the percentage of sulphurets the ore contains. Following is also a practical formula for estimating the percentage of sulphurets in quartz: Take 10,000 grains or 20.8 ounces of crushed ore, which will pass through a 40-mesh wire screen. Wash the ore very carefully in batea or pan and rewash as long as sulphurets appear. Dry and weigh. Each grain of sulphurets will equal $\frac{1}{100}$ of 1%. If the sulphurets weigh 175 grains, the quartz contains 1¾% of sulphurets; or, if twenty grains, ⅛ of 1%. If the sulphurets are worth $100 per ton, the value of sulphurets in each ton of ore is $1.75, if ⅛ of 1%—20 cents per ton. To test tailings, dry and weigh 10,000 grains; wash as above; dry and weigh the sulphurets; each grain will represent $\frac{1}{100}$ of 1% and a loss of 1% per ton if the sulphurets are worth $100 per ton. Thus, if the 10,000 grains of tailings yield 3½ grains of sulphurets, the loss is 3½ cents per ton in sulphurets. If the sulphurets are worth $60 per ton, multiply 60 by 3½, and 2.1 cents is the value of the sulphurets in one ton of tailings; if they are worth $375 per ton, multiply as above, and the value in each ton of tailings is 13.12 cents per ton in sulphurets.

WHEN a shaft has become too deep for a windlass a horse whim may be substituted. It is light, inexpensive, and easily and quickly erected. The work done by an average horse, per minute, is taken as 19,800 foot-pounds; speed of travel while hoisting, 3½ to 4 miles per hour, and the average tractive force about fifty-five pounds. The power developed and the hoisting speed will depend upon the relative diameters of drum and the circular path traversed by the horse. With a well-constructed whim the duty of a single horse may be taken as a gross load of 600 pounds, raised at a speed of 35 feet per minute. This includes the weight of bucket and rope. With an unbalanced bucket the useful work of a horse is reduced from 19,600 to say 14,000 foot-pounds per minute. Under these circumstances, at a depth of 250 feet, a maximum of 15 tons can be hoisted by one horse in ten hours. Light steel buckets for whim work weigh 200 to 300 pounds, and the rope would generally be of steel, ½ or ⅝ diameter, weighing, respectively, 0.35 and 0.60 pound per foot. One-horse whims have been used to as great a depth as 450 feet, but such practice is very unusual, because the speed must be slow and the net load reduced on account of the weight of the rope. With two horses a gross load of 800 pounds can be raised 50 feet per minute in regular work. It is generally better to increase the speed than the load, by using a larger drum, because small buckets can be more conveniently handled at the surface. With gearing the angular velocity of the drum is about one-third that of the sweep; that is, if the beveled pinion on the vertical shaft have twenty teeth, the spur wheel on the drum shaft would have sixty teeth. For one and two horse whims only one man is actually required at the surface; for larger machines two men are employed, one as driver, the other to handle the bucket and brake. Whim horses may be controlled by the voice, being taught to start and stop without a driver. Whims are commonly provided with stop-brakes, so that the empty bucket may be lowered while the horse is standing at rest. They are made generally for a single bucket, as a pair of buckets are liable to strike each other in passing in the shaft, but, of course, there are the same advantages in using balanced buckets as obtain with the windlass.

MUCH has lately been said about ore stealing in Colorado mines, and instances given of the discharge of an entire shift for wholesale theft. Probably in no place in the world is ore stealing so prevalent and universal a practice as in Bolivia, where has been developed an aptitude for making way with rich mineral remarkable for its varied ingenuity. Apparently, no amount of surveillance can prevent it. At these mines numerous watchmen and other employes are maintained with but dubious results. With the idea of reducing stealing to a minimum, the laborers in some of the mines at Colquechaca are kept underground and nominally at work for twenty-four hours each alternate day. For this they receive two days' wages, though the actual working time is considerably less, for no man can work effectively for so many consecutive hours, especially at the great altitude of Colquechaca. The theory is that every time a laborer comes out of the mine he carries with him some portion of stolen ore, and therefore the fewer times he has occasion to go to the surface the less he is able to steal. This seems sound, but the mining companies undoubtedly lose more in paying for work that is not done than is gained by the adoption of this method for preventing theft. The laborers seem destitute of moral sense and are marvelously adept in the art of stealing. Their fertility in the devising of new methods for carrying off rich pieces of ore, in spite of careful watching and systematic searching, is shown in numerous ways, some of which are indescribable. Pure ruby silver is ground to powder, sewn up in tiny muslin bags or pads, and concealed in the lining of clothing; powdered ruby is rubbed in the hair—of which the Bolivian has a very heavy growth—the hair and scalp being generously anointed with lamp oil or candle grease; the whole body is sometimes covered with oil or grease and the precious ruby rubbed in, to be removed afterward by a hot bath; small masses or crystals of ruby silver are concealed under the tongue, in cavities of the teeth, in the cheeks, ears, nose or other parts of the body. A bit of mine timber, or the broken handle of a pick or hammer, is sometimes hollowed out and pieces of stolen mineral put in, the opening being carefully concealed by a well-fitting wooden plug. These pieces of wood are then thrown into a car of waste; a confederate, at a distance outside, notes where the stick lodges as it goes over the dump and watches his chance to recover it. This method is possible on account of the very small amount of timber used in these mines, so that a bit thrown on the waste dump is a conspicuous object.

The Joplin Zinc District of South-West Missouri.*

Written for the MINING AND SCIENTIFIC PRESS by JAMES H. STEELE.

The western mining world is only just beginning to hear of this district. It seems strange that this community should have reached its present importance as a mining center in such a quiet manner. The daily press, while usually so anxious to herald to the world anything out of the ordinary, has in its haste entirely overlooked this great camp.

That it is great, no one conversant with its present condition will deny. That it is destined to become greater than the greatest of base metal producers, is also plainly evident to the discerning eye. Not alone are the deposits of almost limitless extent, but the unrivaled purity of the metals produced from these ores assures the miner of top prices in any market. A few years ago the region was barely noted in the books as zinc producing, while to-day it produces over one-third the world's supply.

Our lead is as pure, if not so abundant as our zinc, and is a potent factor in ranking Missouri as one of the great mining States of the Union.

Lead has been mined here for a century and a quarter; zinc, however, has reached its importance only in the last decade. Just as many western silver camps have changed since 1873 to gold producers, so has Joplin changed from a lead camp, where zinc was thrown on the dump, to the greatest zinc producing district in the world.

The following table gives the value of the combined lead and zinc output for the past five years. The magnitude of last year's production, as well as the increase over previous years, will be noted:

Zinc and lead sales in 1895	$3,771,979
1896	3,867,595
1897	4,805,637
1898	7,171,814
1899	10,864,476

In the face of such figures, it is not to be wondered at that farmers in all directions from the mining centers are delving beneath their fields and orchards in search of the zinc and lead that has enriched so many of their neighbors.

The Joplin district is in the southwestern corner of Missouri, about 165 miles directly south of Kansas City.

The city of Joplin is the commercial center of the district. Within a radius of 15 miles are located the lesser camps of Carterville, Webb City and Carthage, in Missouri, and Galena, just across the line in Kansas.

Although Joplin depends entirely on the mining industry, it is remarkably free from the features that usually characterize a mining town in a state of boom. It is a well organized, strictly modern city, claiming to-day a population of 40,000, being an increase of just 100% for the year 1899. This increase is due to the great advance in prices paid by the zinc smelters for the raw ore.

Fine buildings and imposing business blocks present a curious contrast to the ramshackle mine buildings and unsightly dump piles that surround the city on all sides. Just such a combination of a modern city and a mining camp of tents and bunk houses merging into and becoming parts of each other is not to be seen elsewhere in the United States, or in the world. A ten-minute walk in any direction brings one into the heart of the mining district. Nor is it all necessary to walk. A rapid-transit electric system, over 35 miles in length, furnishes a means of easy access to all the important parts of the entire region, from Galena, Kan., on the south, through Joplin to the beautiful residence city of Carthage on the north. This is supplemented by local trains on one of the steam lines. The benefits of a city equipped with a paid fire department, gas and electric lighting, sewers and macadamized streets are enjoyed by Joplinites.

The Joplin district proper is an area of about 200 square miles around Joplin as a center. It is a flat, gently-rolling prairie country; the district is connected by a system of macadamized roads, well kept, rendering wagon haulage cheap and comfortable. The surfacing material used on these roads is crushed flint—tailings from the mills. These tailings are also used by the railroads for ballast and are spread hundreds of miles over southern Missouri in this manner.

Joplin is a "poor man's camp." A man with a few hundred dollars has an opportunity to better himself. In all digging, labor is the chief expense. Ore can be taken out with an equipment that is surprisingly cheap and simple. The royalty, or leasing, system prevails here, and it, together with the methods of marketing the ore and the mode of settlement, are unique and worthy of note.

As all the land was taken up as homesteads before mineral was discovered, it is found that the present owners are nearly all farmers, except where the land has changed hands within the last few years. The original owners seldom do any mining themselves, but prefer to lease their land in parcels of from ten to forty acres, as so-called "first leases." These tracts are now divided up into mining lots 200 feet square, which are subleased to the mining operators or second leasors. Royalties are paid on gross sales of ore. The almost universal rates are 10% for first leases and 20% for second leases. The miner prospects his land, develops it and produces the ore at his own expense. Prospecting is done by means of the churn drills, putting in 5-inch or 6-inch holes 150 or 200 feet. Diamond drills can not be used, on account of the open nature of the formation.

Before becoming salable the ore must be washed, which is done in hand or steam jigs, according to the financial condition of the operator.

In the matter of selling the ore the practice here differs materially from that of most other localities.

The concentrates are sold once a week at the mills. They are purchased by the smelters at Cherryvale and Iola, Kansas, the Empire Zinc Co. of Joplin and Mattheson & Heigler at La Salle, Ill., and some are shipped to Swansea, Wales, and to Belgium. The purchasing agents of the smelters are known as "jack buyers," jack being the exclusive local name for zinc ore.

The output of the mines and mills is never contracted for in advance, but simply disposed of as produced.

The concentrates are not sold by assay, but by inspection. The jack buyer visits each mine once a week. He goes to the bin, takes up a handful of concentrates, and, letting them slip through his fingers, mentally notes the presence or absence of gangue material, and names a price of so many dollars per ton for the lot, without any further knowledge of its value than its hasty inspection tells him. This has been the method of sale ever since the first discoveries of zinc and lead. The more experienced buyers claim to be able to judge the value of concentrates to within 1%, and, as most mill men or ore men become equally clever, this arrangement has always been satisfactory. Lately, however, the Mine Owners' Association has been making great efforts to change the system and have all sales made according to assay. Is has been in a measure successful. Another thing they have been trying to regulate is the price of jack, or, at least, they insist that it should be regulated by the price of spelter in St. Louis. Heretofore the price of raw ore has borne no relation to the price of zinc, prices of each fluctuating entirely independent of the other up to five years ago; $23 per 2000 pounds for 66% ore was considered top price, while one month last year as much as $55 per ton was paid. During January, 1900, $35 was the average price; $30 is considered the normal figure to be looked for in the future. The great advance over previous years was due to the increased consumption in the manufacture of brass, galvanizing iron for electrical purposes and in cyaniding gold ores.

Corresponding to the weekly sales of ores, all mining business is settled up every Saturday night and in a most novel manner. All parties concerned meet at some down-town resort, such as hotel lobbies, saloons, stores, or any convenient place. In the usual case, where there are two leases, four distinct operations take place in the course of the settlement. Although the jack buyer buys the ore from the miner, he makes out his check and hands it to the land owner or his agent. This person deducts 10% for royalty and gives the first leasor a check for the remainder. The man who sold the ore now receives a check equal to 80% of the gross sale price, and, lastly, the men are paid off usually with checks, also. All the banks of Joplin are open two or three hours on Saturday night to accommodate the mining men.

There are estimated to be 400 concentrating mills in the district, 150 of which were put up during 1899. From the top of an old dump near Carterville the writer counted forty-eight mills in operation.

Ore dressing in this district is only just beginning to emerge from the primitive conditions that have so long characterized it.

For many years it was the practice to dump the ore over a grizzly, to separate the ore from the larger pieces of rock and boulders of flint. What passed through was washed in sluice boxes. This was very wasteful and slow, and later was supplemented by hand jigs, which have continued in use up to the present time.

The jigs are the ordinary hand jigs, consisting of a shallow box having a screen or grate bars for a bottom, suspended in a tank of water. The ore is placed in this box, which is then given a springing motion by means of a long pole, to which it is attached. The ore, being heavier than the gangue, settles faster and falls to the bottom of the tank, where it is saved.

Although many large mines still handle their output in this manner, the great majority are equipped with the standard 100-ton mill. The concentration is effected entirely in Hartz jigs. The ore is crushed to about ½-inch or less and sent over the jigs, big and little together. No attempt is made at sizing. It is an easy separation, owing to the great difference in specific gravity between the Pb and Zn sulphides and the lime and flint gangue.

The losses in the tailings are from 1% to 3% Zn and very little Pb. Nearly all of this could be saved on any of the shaking tables, few of which are in use here. A "sludge" or slime mill has been in operation for many years at Galena, Kan., treating the tails from the neighboring mills. They crush fine and run the pulp through sluices, where the surface of the water is continuously slapped by strips of canvas on the end of sticks wielded by boys, thus causing the slimes to settle to the bottom.

The earlier diggings were for lead and were undertaken without capital, and therefore with little or no machinery. The deposits were found near the surface and were often worked by open cuts. When shafts were sunk they were small affairs, just large enough to get a "tub" through. As soon as ore was struck the miner would gouge around and take out what he could above water level. In this manner a number of shafts would be put down on one lot. The large rooms from which the ore was taken were left without support of any kind, and as a result the older tracts around Webb City and Carterville are marked by great yawning pits, showing where the ground has caved in on the long-abandoned workings. It is said that in the old Victor tract five acres are undermined in this manner. The Four Aces mill was moved three times on account of the ground caving under it. The mining done to-day is but little in advance of these practices.

The shafts sunk are usually 5 feet square. They are cribbed 20 or 30 feet from the surface when they pass through loose ground. Below that they are rarely timbered, being in hard rock. Most miners begin to gouge out the minute they cut it, without regard to their present safety or future extraction of ore. Sometimes the ore immediately around the shaft is entirely removed, so that the shaft opens into a room like the bunghole in a barrel.

Where a definite plan of mining is followed the system of pillars and rooms similar to that used in coal mining is the one adopted. The ore bodies are continuons through bodies of ground 20 to 40 feet high and of indefinite lateral extent, so this is the only method adaptable to the ore extraction.

The ore is broken down by a system of underhand stoping. In the wall or face of ore to be attacked a heading is driven next the roof just high enough for men to work in, and to any desired depth. This leaves a sort of shelf, which is shot down and the heading again driven forward. Except in driving the heading the shots are always put in the floor. This results in a series of rough steps or benches 10 feet in height and sloping to the roof. The rock as it is broken out rolls down this incline to the bottom of the level, from where it is trammed to the shaft.

In the ordinary hoisting plant the engine is placed in a little house set up 20 or 30 feet above the collar of the shaft, and above the charging floor of the mill. The tubs are pulled up through the floor of the engine house and dumped on the platform of the mill by the hoister man. One mill often handles the output of two or three shafts, in which case the tubs are trammed across the intervening spaces on trestles 20 or 30 feet above the ground. There will often be a half dozen shafts in a group within 100 feet of each other.

It is generally an easy matter to have good air in the mines without the use of artificial ventilation. In all the largely worked parts the drifts and stopes of neighboring properties all open into each other, affording a good natural draft. In the more isolated tracts, where only one shaft is down, small fan blowers are put in and the air conducted in the mine through canvas tubes.

GEOLOGY OF THE DISTRICT.—The country rock of the entire district is of sedimentary origin. It consists mainly of limestones, shales, sandstones, cherts or flint. These occupy a nearly horizontal position, having been only slightly disturbed since they were deposited on the bottom of the ancient seas. The general dip is toward the west, but so slight as to be hardly perceptible. The country is crossed by many vertical fault planes, but the movement has almost always been very slight, usually a few inches at most, so they produced no fissure of any consequence. They really amount to nothing more than the common joint cracks to be seen in any deposit of limestone. These rocks belong to the lower Carboniferous epoch. Occasional small pockets of coal are found in the shale. Almost all the mineral deposits occur in the limestone and in the chert.

The form of the ore bodies here can best be described by the word massive. They are immense deposits which, when mined out, leave chambers of enormous extent. The thickness is usually much less than the lateral dimensions. Twenty to 60 feet is a common thickness, while they are hundreds of feet in diameter. The exact shape of most deposits is not known, as they pass outside the boundaries of the land operated by any one company. There is also a great lack of maps of underground workings.

The upper and lower limits of the ore bodies are usually very clearly marked by a capping of barren lime or chert. In a horizontal direction the zinc and lead will thin out without any change in the gangue. Beyond the main body the gangue will not always be entirely barren, but small streamers of ore can be traced through it in all directions from a few inches to a knife blade in thickness. These are not at all certain to lead to another body, but they are about all the miner has to guide him in looking for new bodies.

In some cases pipes or chimneys occur, but these are considered simply as modifications of the general

*See illustrations on front page.

massive form. A somewhat common form is a series of rough sheets or layers of ore alternating with limestone or flint. Distinct fissure veins do not occur, the nearest approach to these being the horizontal sheets just mentioned. No matter what the relation of the gangue to ore in the ore bodies, the latter are invariably of the massive or cavernous order. This is sometimes called a blanket formation, but that name can be rightly applied only to the country rock, and not to the ore formation.

In only a few places does the mineral outcrop at the surface, but it is regularly found up to within 10 feet.

The deepest shafts in the district are about 200 feet, while fully 50% are less than 150 feet. The ore bodies cut by these at the various depths all have the same general form and characteristics. Although the ground has been opened only to such slight depth, yet it is known that the ore bodies continue to much greater depth, even up to 1000 feet. Boreholes have been put down in all parts of the region to great depths. Holes made by different operators and in widely separated places agree as to the existence of far richer and larger deposits at 500 feet than those now known above 200 feet.

The lead and zinc occur as sulphides mainly. Blende or jack furnishes almost all of the zinc. Jack is found both massive and in a disseminated condition, and in crystals. As the latter it is found lining the cavities in the limestone which are so common. The sulphide—galena—furnishes all of the lead. The carbonate—cerussite—is found in small amounts near the surface. Pyrite—locally "mundic"—occurs in some places with the lead, but is a detriment to the ore, as it can not be separated from the lead by the jigs, and $1 for each per cent is deducted from the price of ores. The galena and blende from here are extremely pure and command a high price accordingly. Not a trace of gold and only a trace of silver is ever found in these ores, which is in itself a peculiar fact.

Mixtures of gangue or vein stuffs and minerals—metalliferous and others—compose the ore deposits. Although some shales and sandstones occur, together with dolomite, heavy spar and clays, by far the most common gangue materials are flint and limestone, and of these two flint is in the greatest abundance.

The ore bodies are enormous masses of breccia. The fragments are mainly flint derived from the country rock. Limestone is also often found. The fragments are always angular and never water worn. The interstices are filled with jack or galena, or both, deposited from solutions. The flints vary in size from that of a pea to several feet or more in diameter. The flint is always barren. The sulphides are more disseminated through it, as they are through the limestone. Zinc and lead will often be found separated from each other in the same brecciated mass.

In the Big Four mine at Galena, Kansas, in an ore body 40 feet thick, jack is found in the first 10 feet. Below that lead is found, without a trace of zinc. Zinc and lead both occur in irregular sheets or veins, sometimes forming the cementing material of the breccia.

In places where the lime is not badly broken up ore is found in seams and pockets along the bedding planes. When these widen out into large chambers flint fragments begin to come in. Calcite, borite, dolomite, bitumen and quartz are also found as accessory minerals.

Following are the Missouri–Kansas district sales of zinc and lead ore for the week ending May 12th and the total sales since January 1, 1900:

Camps.	Zinc, lbs.	Lead, lbs.	Value.
Galena and Empire, Kan..	2,098,230	230,640	$ 34,860
Joplin, Mo	2,879,670	539,670	56,504
Carterville	2,304,290	365,340	40,720
Aurora	1,280,000	34,000	13,243
Webb City	529,980	51,180	8,632
Oronogo	520,700	2,830	7,681
Granby	383,000	18,200	4,810
Zincite	365,390	8,950	4,780
Duenweg	153,090	70,680	3,342
Roaring Springs	96,350	6,380	1,452
Neck City	466,140	....	7,235
Stotts City	370,400	....	5,850
Carthage	264,660	....	4,499
Central City	196,600	....	1,845
Cave Springs	94,530	....	1,275
Everton	59,100	....	443
Dist. total for last week..	12,062,130	1,327,870	$197,171
District total since Jan. 1, 1900	194,843,850	21,782,490	3,377,308

Joplin, Mo., May 15.

THE Virginia, Nevada, Chronicle says: A combination compound of carbon dioxide and nitrogen, prepared by F. E. Fielding, assayer at the Con. Cal. & Va. office, to absorb the gas generated by blasting with giant powder, is a success. The compound was placed in a rectangular box 3 feet long, 28 inches wide, 10 inches deep, run on a truck into within 30 feet of the face of a drift where a round of holes had been fired and absorbed the nitrous oxide gas, produced by blasting with giant in twenty minutes, using twelve sticks of powder. After the compound had been absorbed the powder gas is dissipated in a short time after coming in contact with pure air and the compound can be used over and over again.

Treatment of Copper Mattes in the Bessemer Converter.*

NUMBER V.—CONCLUDED.

Instead of cooling the copper in moulds it may be poured into a refining furnace as we have said is done at Anaconda, and at once brought up to any desired pitch. When this is done, if the matte be poured direct from the furnace in which it is made to the converter and then to the refinery, the processes of matting, concentrating, and refining are unbroken and continuous, and can be probably more economically conducted in the three vessels than will ever be done in one.

The lining when it has become dangerously thin is everywhere rough and rugged. The lining of the body of the converter is much more corroded than that of the cover which, though it has to be removed after each charge, does not require to be as often replaced. As, moreover, the boiling charge never actually reaches the cover nor attacks it, it can be lined with a more tenacious and less siliceous mixture than the body of the converter. The almost universal custom is to cool the exhausted converter by the injection of water, then to reline to the full thickness of, say, 18 inches, dry, and heat with coke into which a low blast is injected through the tuyeres to facilitate the drying. To prevent the loosening of the lining from the shell the upper part of the body and the cover are by some manufacturers perforated with holes. The methods of inserting the lining have already been explained.

There is a good deal of discrepancy in statements as to the value of the slag. Slag unmixed with matte from the first blow undoubtedly often runs under 1% of copper; but it requires very careful pouring and sorting to secure such a result, while the 5% copper contents given by Hixon as being in the slag at Anaconda and Aguas Calientes is high. An average of 2½% is probably not far from the mark, though a much cleaner slag can be selected. The cost of doing so and the uncertainty of the result has induced the works almost without exception to rehandle the total bulk of the converter slag. If reverberatory smelters are used and they are near the converter the liquid slags are settled in them. At the Clifton works, the slags being slightly basic and the ore charge acid, they are advantageously added to the ore in the cupolas. The quantity of slag depends on the grade of the matte treated.

COST OF CONVERTING.

The cost of the pneumatic concentration of matte to copper of course varies widely; no estimates which would hold good in any two works can be made. If remelting of the matte must be resorted to it alone will increase the cost by ½ to ¼ cent per pound of copper. Where water power is available the chief item of expense—the cost of blast—is largely eliminated, and where the plant is conveniently arranged the handling of the fresh and exhausted converters, the lining, and the disposal of the slags cost less than in ill-designed establishments.

Mr. Burthe, in his description of the David selecteur, gives what he claims are actual figures of the cost of converting into copper a 35% matte at Aiguilles. They are as follows:

With the high cost of labor, even in the cheapest American labor market, this low figure of 0.36 cent per pound has probably never been reached. The figure at which the operation can be conducted under favorable conditions in this country lies between the Anaconda prices (viz: 0.607 cent) as given by Hixon, and French prices.

Hixon gives the following estimate as that of the average cost of converting 55% matte:

Remelting matte	0.2
Labor and lining for converters	0.25
Labor on converters	0.1
Resmelting converter slag	0.05
Supplies	0.05
Total	0.65
For a plant without remelting	0.45

Assuming that the power consumed to make 1,000,000 pounds of copper per month in one converter is 110 H. P. (NOTE.—In steel making, 200 pounds of coal per ton of steel made are generally calculated as consumed in running the blowing engine): that in creating 110 H. P. with the ordinary blowing engine five tons of coal are consumed per day, which represents about twice the quantity of coal per ton of matte as per ton of steel: that about 250 tons of clay and quartz are consumed, and at the outside 1000 days' labor, including superintendence, are expended on the making of the 1,000,000 pounds of copper, any one can calculate for himself what the cost will be in any given locality where the cost of fuel, lining material, and labor is known. It must be remembered that the work is attended with some little risk, and requires more than average intelligence and special skill on the part of the workman, and that, therefore, high wages should be allowed.

The actual losses are more difficult to arrive at than the cost of operation. At the works I am connected with the converter dust and fumes enter the system of furnace flues and dust chamber, and therefore their quantity and contents cannot be ascertained.

Hixon says with regard to losses at Anaconda: "The losses in converting as shown at Anaconda were about 3% of the copper contents, but there was a wide difference between assays of samples of matte taken at the converter plant and at the smelter. This difference amounted to 0.5% on all the matte received, and represented about 1% of the loss, so the real loss was probably only 2% of the copper. The silver loss was apparently high according to assays of the converter copper, but the casting showed a corresponding gain, and after making allowance for this, the loss of silver in converting was reckoned at less than 1%."

Reverting to the table and series of analyses given above, the loss of silver in excess of copper would seem to be but 4%, but the data are admittedly unreliable. The copper, silver, and gold in the crust of the hood are almost exactly the same as in the white metal. The evidence, however, suffices to show that the loss is not great, and that therefore that method of converting and casting the fused converter copper into anodes, taken in connection with electrolytic separation, is less wasteful than any of the old processes. I do not refer to the direct method of James & Nicholls, which is probably to be preferred if white metal and not low grade matte is the material to be operated on. There is no reason to think that copper is volatilized to any extent; the flame from the converter mouth does not denote it.

The loss of silver is admittedly large where zinc and lead in any notable quantity are present. At the Aguas Calientes works in Mexico, where copper is used as the absorbent of gold and silver, and dry silver and gold ores are smelted with copper ore and matte into matte to be subsequently converted, no ore with an excess of 5% of lead and zinc is admitted to the copper furnaces.

Experience at these works where the contents of purchased ore has to be accounted for in the finished product, has fixed these percentages of the two dangerous associates as the maximum that can be safely allowed. If the slags are remelted, the loss in them is not in excess of the copper in the furnace slags, which in matte smelting in Arizona is about half of 1%. In the run tabulated above there were made sixty-two pots of slag of about 250 pounds each, 15,000 pounds, or approximately the same weight of slag as copper produced, assuming the weight of the slag to be that of the copper produced, and therefore one-half of the charge of 50% matte, and that the slags run 2½% in copper, they carry over for subsequent treatment over 2½% of the copper in the charge.

The importance of more exact investigation than has yet been given to the thermochemistry of copper converting can hardly be overestimated, even when measured by the low standard of the material interests involved and quantity of copper made annually by the pneumatic method. At present there are in the United States thirty-eight stands, about thirty of which are generally in blast, pouring out about 350,000,000 pounds of copper annually and about 9,000,000 ounces of silver and about 30,000 ounces of gold.

	OLD STYLE OF CONVERTING.					DAVID SELECTEUR.				
	No. of days.		fr.			No. of days.		fr.		
General labor, foreman	0.446	at	5	2.230		0.375	at	5	1.875	
Laborers	1.785	at	3.50	6.247		0.752	at	3.50	2.602	
					8.477					4.507
Lining, laborers	0.446	at	4	1.784		0.188	at	4	0.752	
Lining, T.	0.892	at	2.50	2.230		0.377	at	2.50	0.943	
Clay and quartz	0.894	at	6.50	5.811		0.380	at	6.50	0.476	
					9.825					4.171
Blowing, labor	0.446	at	5	2.230		0.375	at	5	1.875	
Blowing, fuel	0.420	at	20	8.400		0.253	at	20	5.060	
Sundries	0.651								0.538	
					11.281					7.473
Repairs and sundries	10.950									5.546
Per 1000 kilos	40.533									21.691

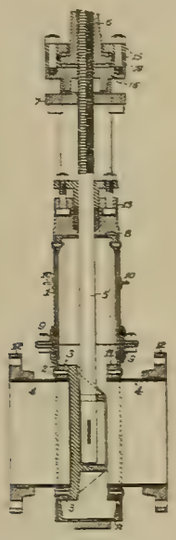
*Condensed from a paper read by JAMES DOUGLAS before the London Institution Mining and Metallurgy.

Mining and Metallurgical Patents.

Patents Issued May 29, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

STEEL WATER GATE.—No. 650,502: J. Bouse. San Francisco. Cal.



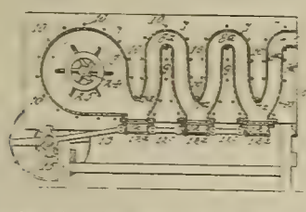
A water gate consisting of separable segmental sections formed of bent channel or angle iron frames with sheet metal side plates and rectangular angle iron frames surrounding their meeting edges adapted to be secured together, circular openings formed in opposite sides of lower part of case having annular interior screw-threaded rings fixed around openings, correspondingly screw-threaded tubes adapted to be removably screwed into rings, tubes having flanges surrounding their outer ends and forming connections with corresponding flanges of line of conducting pipe. An annular valve seat surrounding opening upon one side, valve adapted to close against seat or be withdraw into upper part of casing, screw shank extending through stuffing-box in casing having one end connected with valve, other end passing through turnable nut whereby screw is reciprocated to open or close valve, and yoke removably bolted to casing forming support for nut and guide for screw.

INDICATOR FOR SHAFTS.—No. 650,517: J. Place. Duluth, Minn.



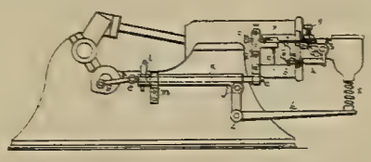
An indicator for shafts comprising lever, bracket for pivotally supporting lever extending at its upper end between legs of bracket, springs interposed between lever and each of legs of bracket for holding lever normally in an intermediate position, a divided collar adapted to be adjustably secured to periphery of shaft at suitable point to strike one end of lever as shaft revolves, cable secured to other end of lever connected with indicator shaft, construction being such that upon revolution of shaft indicator will be turned in one direction or other according to direction of revolution of shaft.

APPARATUS FOR SEPARATING METALS FROM THEIR ORES, ETC.—No. 650,800: F. H. Smith and L. V. Bond, Denver, Colo.



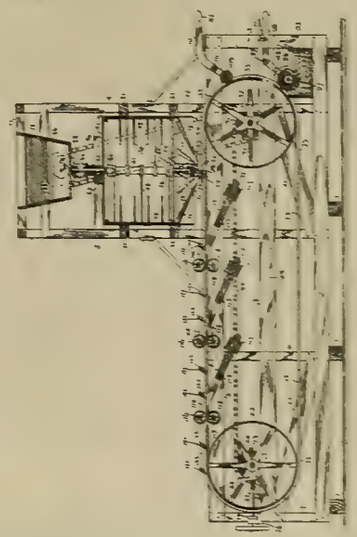
Combination of casing, comprising two vertical side walls, serpentine plate clamped between walls and forming drum compartment, several upright compartments communicating with drum compartment, double upright partition projecting into each upright compartment forming serpentine channel, fan located in drum compartment, reciprocating mineral box located below each depending bend of serpentine channel, links connecting mineral boxes, shaft, pitman connected with shaft at one extremity and with one of end mineral boxes at other extremity for imparting reciprocating movement to series of mineral boxes, means for feeding material to be treated to drum, and means for operating fan to induce an air current in direction to draw material into drum and carry it through serpentine channel.

GAS OR OIL ENGINE.—No. 650,571: H. Swain, San Francisco. Cal.



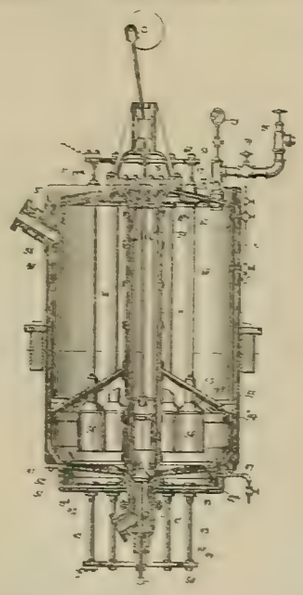
In a gas or oil engine connecting rod N operated by crank and sliding rod E operating sparking hammer P having an incline V in combination with latch B operating sparking point R through rock shaft S' and S.

AMALGAMATOR.—No. 650,581: A. M. Ernsberger. New York, N. Y.



An amalgamating machine, framework supporting drums carrying an amalgamated belt, disintegrating cylinder supported by framework above belt and having shaft therein and means for driving from drum shaft, hopper above disintegrating cylinder, double inclines in hopper centrally inclined having central space between them, oppositely disposed slides under inclines to increase or decrease central space, shaft within hopper, right and left hand screw blades thereon, spouts from hopper bottom at end of screws and leading into disintegrating cylinder, means to positively move shaft and screw blades, from drum shaft of machine.

APPARATUS FOR ELECTROLYTIC REDUCTION OF ORES.—No. 650,646: F. H. Long. Chicago. Ill.



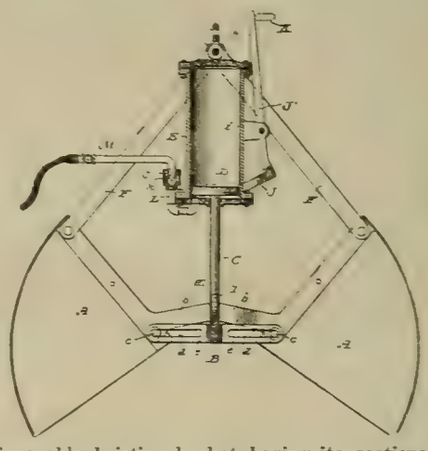
An electrolytic apparatus, combination with closed reducer vessel having diaphragm near its bottom and cathode beneath same, of upright penstock communicating above and below with vessel, valved pump plunger reciprocating therein, and set of anodes arranged about penstock whereby charge is exposed to electrolytic action in flowing from vessel into penstock.

CABLE TRAMWAY GRIP.—No. 650,590: A. Rosenholz. San Francisco, Cal., assignor to the Trenton Iron Co., Trenton, N. J.



In a cable tramway conveyer, combination of conveyer frame and trolley frame movably carried thereon and adapted to travel upon track or cable, pair of jaws adapted to engage with moving cable, and rotatively mounted to automatically adjust themselves to line of cable, one jaw being movable with relation to the other, mechanism connecting trolley frame with movable jaw whereby latter is closed to grip cable between it and stationary jaw by suspended weight, a supplemental track disposed with relation to main track or cable, and pulley carried by conveyer frame adapted to ride upon track to support main frame so that gripping jaws are released from traveling cable.

HOISTING BUCKET.—No. 650,642; J. E. Henry, Sheboygan, Wis.



Separable hoisting bucket having its sections in pivotal union, crosshead with which bucket sections have slide connection, cylinder in link connection with bucket sections provided with inlet designed to have tight temporary connection with nozzle of conveyer for fluid under pressure, piston in cylinder opposed to inflow of fluid, rod connecting crosshead and piston, latches in connection with crosshead automatically engageable with cylinder, and latch retracting spanner in pivotal connection with cylinder.

ORE LIFTER FOR DIAMOND DRILLS.—No. 650,686: G. Leask. Nanaimo, B. C.



Cutter head provided with longitudinal ports and valve chambers, core barrel provided with diagonal

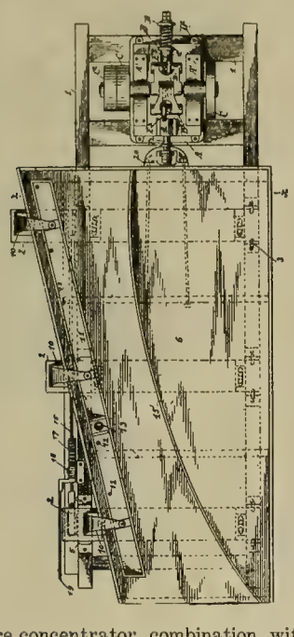
guide passages communicating with valve chambers, valve casing mounted in cutter head and formed with lateral ports and longitudinal ports, tubular spring-actuated valve and independent ball valve, spring-actuated valves mounted in valve chambers, and gripper pins having sliding engagement with core barrel.

SMELTER'S CRUCIBLE SHAKER.—No. 650,648; W. S. Mather, Newark, N. J.



A smelter's crucible shaker, combination of base plate providing seat for crucible, series of projections upon base plate surrounding crucible, lever removably fulcrumed at its lower end upon base plate and extending upward substantially parallel to length of crucible, and band of metal fastened to lever and lying in plane perpendicular thereto and being bent to grasp crucible.

ORE CONCENTRATOR.—No. 650,673; W. G. Dodd, San Francisco, Cal.



In an ore concentrator, combination with concentrating table having plane upper surface, of ore and water feed arranged thereabove, curved obstructing rib on face of table following generally inclined course from upper head portion to lower tail portion of table, of devices for regulating lateral inclination of table, curved obstructing rib 15′ on face of table arranged to generally follow line of travel of ore over working face of table, upper edge of rib gradually inclining from head end toward tail end of machine, mechanism by means of which variable reciprocating motion may be imparted to concentrating table.

METHOD OF OBTAINING ALUMINA FROM ITS ORES.—No. 650,763; E. Raynaud, Tessenderloo, Belgium.

Process for extracting alumina from aluminous ores which resist attack wholly or partially by sulphurous acid consisting in mixing with previously crushed ore quantity of sulphureted compounds of alkaline metals smaller than would be necessary for forming aluminates, heating mixture to dark-red heat in suitable furnace and submitting mass issuing from furnace to lixiviation and thereafter to action of current of sulphurous acid gas in combination with water, separating solutions holding alumina from residue containing impurities, heating thereafter these solutions and calcining precipitate obtained which yields alumina and sulphurous gas (SO_2)

METHOD OF LEACHING COPPER ORES.—No. 650,784; J. W. Neill, Salt Lake City, Utah.

Process of treating and extracting copper from sulphide of copper ores, tailings or material containing sulphide of copper, consisting in roasting ore in presence of air, thereby oxidizing and liberating sulphur therein combined, thus forming sulphurous acid gas, collecting product of combustion and oxidation in water, thus forming sulphurous acid, dissolving copper contained in burned ore by means of solution obtained from water and product of combustion and oxidation and precipitating copper from resultant solution by heating same.

Jeffrey Self-Propelling Gold Dredger.

The accompanying illustration shows the Jeffrey self-propelling gold dredger used on the Yukon river and elsewhere. The dredging is done by means of an adjustable elevator constructed of two chains and provided with buckets of suitable size and shape for digging. The elevator is pivoted at the delivery end so that it can be raised and lowered to suit the depth of the water. The material as it is discharged from the buckets falls onto a coarse screen or grizzly. The large stones and other worthless material pass over the grizzly and are discharged back into the water, the finer and gold-bearing material passes through the screen onto gold-saving tables or other appliances generally used for gold-saving purposes. The elevator is operated by means of an engine, either steam or gasoline. Suitable hoisting drums are also provided for raising and lowering the elevator, shifting the boat, etc. The boat is propelled by means of a stern wheel driven by sprocket wheels and chain from the engine, which also furnishes power for the balance of the machine. The engine and other parts of the equipment are built to suit the capacity and the depth of the water. The machinery for these boats, consisting of elevator, stern wheel drive, drums, engine, boiler, etc., is furnished by The Jeffrey Manufacturing Co., Columbus, Ohio, from whom prices and further particulars can be had upon application.



Self-Propelling Gold Dredger.

To Drive Gases from a Mine, Lay the Dust and Prevent Explosions.

In a conversation with Manager Hutchinson of the Trade Dollar Con. Co., recently, mention was made of the late Utah coal mine disaster and the more recent one in North Carolina, whereupon Mr. Hutchinson remarked that he could suggest an absolute preventive to the recurrence of such disasters. He said it was simply to run a steam pipe from the boilers to the farthest workings in the mines, and, as often as the conditions require, to blow a jet of steam into the mines and keep it up until the steam drove the gases and fire damp out at the shaft or openings. He says that a good many years ago he tried this method of clearing a metalliferous mine of poisonous gases in Colorado, and the effect was simply astonishing. He connected a half-inch pipe with a steam pump in the mine and led it to the most remote stope, turned on a full head of steam at 150 pounds pressure, and within five minutes such a stream of poisonous gas and steam was pouring out through the shaft that the man attending the hoist brake in the shaft-house was driven from his post. Within a few minutes the steam was shut off and soon that remaining in the mine condensed and fell, carrying with it every particle of dust in the mine. In a very short time the air in the mine was as clear as a bell. Before this was done the air was so vitiated with poison that miners refused to work in it. When the cloud of steam rolled out of the shaft it was a deep green from the poisons it carried with it.

Experience soon taught him that it was only necessary to repeat this operation, only a few minutes, about once a week to keep the air in this mine pure and wholesome. He says that shortly after this experiment had been made—he thinks it was in 1884—a terrible explosion in a coal mine, near Wilkesbarre, Pa., occurred, and Mr. Hutchinson wrote to the inspector of mines in that State telling him of his experiment in the use of steam, but nothing came of it; and since then an expensive system of laying the dust in mines by spraying them with water has been adopted in many localities. Mr. Hutchinson claims that his system of using steam not only to allay the dust, but to drive carbonic acid and other gases out of the mines, is much cheaper and far more effective than spraying, which merely settles the dust.—De Lamar, Idaho, Nugget.

The Process Should Suit the Ore.

The following question is illustrative of a class that is difficult to satisfactorily answer:

What reagent or strength of cyanide solution is best to use on an ore carrying fine sulphurets, without previous roasting, in a cyanide mill using zinc to precipitate the gold?

Granite, Or., May 28.

So much depends on circumstances. The process must suit the ore. Answer to the question hinges largely on what that particular ore is. It may be that cyanide would be just what is needed in the Oregon case cited; it may be that cyanide should not be thought of in connection with the ore.

The men who have charge of the business of furnishing cyanide plants understand this, and often try to keep a man from putting in a cyanide plant, where they think it would not result profitably. In this they show good business judgment. It would give their process "a black eye" to have sanguine men make failure in its use: failure chargeable to lack of knowledge of the ore rather than lack of merit in the cyanide process. The best thing for our Oregon enquirer to do is to have a thorough laboratory test made of his ore, have it clearly found whether his ore is or is not susceptible of successful cyanide treatment; then, if it is, start on a small scale after repeated experiments, and when he has found by such practical experimenting just what he needs to do in his especial case, he has the knowledge and experience that will suggest to him the business necessity of shutting down the whole thing or enlarging its capacity.

But no rule of thumb can be given. Nothing but intimate knowledge of all the facts could make any advice valuable, and such knowledge can only be secured in the way indicated. Illustrative of this fact may be stated that the amount of cyanide required ranges from one-fourth of one pound to three pounds of cyanide per ton of ore treated, according to the ore and attendant governing local circumstances. The cyanide process is not a universal solvent nor a panacea for all kinds of ore. In a great many cases it is the best, most economical process possible; in some cases it is of no practical use, and its value in any individual case can only be determined by intelligent and extended experiment.

Completing the Process.

TO THE EDITOR:—In your excellent article on "Parting Gold and Silver Bullion," in the issue of May 19th, you stop with the silver. What about the gold?

Butte, Montana, May 31.

In the description of the sulphuric acid process the gold was left as a sediment in the large iron dissolving kettle. A small quantity of fresh acid is added and the gold then removed to a smaller vessel by an iron ladle perforated with holes. It is transferred to another iron pot, in which it receives a number of repeated boilings with fresh strong acid. There are not less than five such boilings. The finishing acids are siphoned off and used upon fresh charges of bullion.

The gold is now transferred to a tub, in which it is washed first with cold water and then with hot. These washings find their way to the silver precipitating tanks. It is now transferred to a lead-lined vat mounted upon a truck. This vat has a perforated false bottom, which is carefully covered with cloth, the whole constituting a large movable filter. Water is now passed through the gold in this filter until it is entirely sweet. If the gold is in coarse particles it may be dried and melted without danger of its being mechanically carried off while placing it in the crucible, but if very fine it is compacted into cakes while wet by hydraulic pressure. The cakes are dried, as were those of silver, in a current of warm air, and melted in a graphite crucible. A trial sample is taken to see if the metal is tough. The presence of even small quantities of lead will render the gold brittle, in which case it is fluxed with niter through an "eye" in a cover of bone ash. When tough it is ladled into iron molds.

Mining on the California Gold Belt.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS, Assistant State Examiner of Mines.

Along the central gold belt of California there is an extensive development of amphibolite schists, resulting from the alteration of massive and fragmental greenstones. In some of these the alteration has proceeded to such an extent that the structure is slaty rather than schistose, and among this latter class are the black slates, altered from diabase tuffs, previously referred to. In many of the mines is found a gray schistose rock composed principally of scales of chlorite or talc with more or less calcite and silica, much of the latter evidently being the result of infiltration. In close proximity to the fissures and forming, in fact, a portion of the veins, these gray slates and schists are not infrequently impregnated with auriferous iron sulphide and gold and constitute a portion of the pay shoot, forming, together with the quartz veins, a mineral zone.

Massive rocks of many kinds become altered by pressure, the stress being relieved by the crushing and deformation of the individual mineral constituents and a readjustment of the fragments which arrange themselves along planes having a certain parallelism. This process is what is termed shearing. From this fragmentary material, by reason of an alteration of the original crystals composing the rock mass, many new minerals are formed and the rock becomes a schist or slate entirely unlike the normal rock in physical appearance, although possibly not differing materially in chemical composition. These schistose or slaty zones are of varying width and are of frequent recurrence within the same massive rock. The zones of schist are practically parallel, having a strike perpendicular to the stress which produced them. The gray slates and black slates derived from the altered greenstones are essentially the same, differing chiefly in their color. The black color is undoubtedly due to carbon though its source is as yet a matter of conjecture. The writer has been informed by a number of mine superintendents along the lode that they have learned, when assaying the black slaty ore, that no reducing agent (charcoal) was found necessary, the charge evidently containing sufficient carbon to reduce the litharge.

Too little attention has been given to the alteration of massive rocks, and a lack of knowledge concerning this important fact often leads to eroneous conclusions in mine development. The miner, searching for a certain contact, passes out of a massive rock into a slaty one, and concludes he has found the contact for which he had been searching, when perchance it is still some distance away. The crosscut is discontinued and it sometimes remains for another to continue it, possibly finding valuable ore deposits in so doing.

Not only do diabase and diorite become altered by the process of shearing, as previously explained, but other massive rocks undergo a somewhat similar alteration, and in some instances massive rocks pass over into other rocks without developing pronounced schistose structure. The large bodies of steatite found in Calaveras county are notable examples of this. Near San Andreas, in the vicinity of the Veritas and Ford mines; on the Sheep Ranch road, three miles from San Andreas; and on the road from Dogtown (near Angels) to Murphys, are occurrences of this character. In these instances a dark green, fine-grained, extremely hard and tough rock alters to a soft steatite (soapstone). The steatite is in part (locally) schistose (talc schist), but mostly massive. In each of the localities mentioned the dark green rock is found in what is probably not its normal condition, though probably near it, and from that every gradation may be observed through a partially altered to a completely altered rock, the extreme phase of which is, as above stated, talc schist or massive steatite. Series of rocks showing this alteration are on exhition at the museum of the State Mining Bureau of California in San Francisco, where may also be found other rock series showing alteration of other massive rocks to schistose and slaty condition.

An important characteristic of the central gold belt, although by no means a persistent one, is the occurrence of large dike-like masses of a highly crystalline rock which is essentially dolomite, consisting of the carbonates of lime and magnesia. These in some localities by the addition of iron carbonate become the mineral ankerite. This dolomitic material is usually accompanied by the beautiful green micaceous mineral mariposite. Occasionally the mariposite is absent. It has been stated that serpentine invariably accompanies the appearance of mariposite in this rock, but this appears to be not always the case. In the counties of Mariposa and Tuolumne, and extending for a distance of 2 miles into the southern portion of Calaveras county, at Carson Hill, the dolomitic vein has its greatest development, being not uncommonly from 100 to 300 feet in width and of remarkable persistence longitudinally. In some places it forms an unbroken outcrop for a distance of several miles, then disappearing, only to reappear farther on, being probably connected underneath the surface. Going northward from Carson Hill, the dolomite is not found until Smith's Flat, west of Angels, is reached, a distance of 5 miles, where it disappears, to reappear again near San Andreas, 13 miles distant from the last-mentioned occurrence. Near Jackson, in Amador county, the dolomitic vein has a width of more than 100 feet and continues in an unbroken outcrop for about 1 mile, when, disappearing as before, it is next again seen in the vicinity of Placerville, in El Dorado county. Wherever found this material presents the same characteristics, a rather coarse to fine, highly crystallized rock, resembling some marble. It is usually accompanied by veins of massive white quartz, which vary from a few inches to 60 feet or more in width. These are found distributed along or near its borders, and also, in some instances, through the middle portion. Occasionally it sends out offshoots or branches to east or west and has many of the structural features peculiar to large intrusive dikes. In addition to the large veins of quartz within the dolomitic mass there is often found a network of smaller quartz veins interlacing it in every direction. In some cases these quartz veins, and more rarely the dolomite itself, are gold-bearing. Throughout the entire length of the gold belt, wherever this dolomitic mineral occurs, it is not uncommon to find that it, like the greenstone, has been crushed, sheared and altered into a schistose, semi-slaty rock, passing, by transitions which may be easily followed, into talc schist. The processes which have resulted in this deformation of the dolomite are identical with those which have changed the massive greenstones to chloritic and talcose schists.

As has been previously stated, an impression has prevailed that the mines of the central gold belt, or mother lode, possessed such pronounced characteristics as to give them a certain similarity. Such, however, is not the case. It is quite true that in certain contiguous localities the mines do bear a certain resemblance to each other, but in the various counties they are as unlike as could be imagined. Some of those of Mariposa and Tuolumne bear a certain resemblance to each other, and these to some extent are not unlike those near Placerville, in El Dorado county. The mines of Amador, however, for the most part differ very materially from those above referred to, while most of the mines of Calaveras are unlike either. It would only be possible to get a definite idea of these mines and their changing characteristics by an intimate description of the mines themselves.

(TO BE CONTINUED.)

The Use of Aluminum Line Wire and Some Constants for Transmission Lines.*

By F. A. C. PERRINE and F. G. BAUM.

Until the present time, discussions of the use of aluminum wire in line construction have been devoted to a consideration of the relative prices of copper and aluminum wires, the conductivity, tensile strength and other proportions of the aluminum wire being only considered as determining its relative price. During the past year the manufacturers of aluminum have demonstrated their ability to sell this wire at a price well below twice the price of copper per pound, and in consequence the new material has forced itself upon our notice and has demanded that we consider carefully all of its properties independent of any consideration of price. Having recently been forced into the purchase of a considerable amount of this wire by reason of the high price of copper and the low price of aluminum, the writers have made a careful study of the wire supplied, and now present the results obtained, in hope that they may be of service to other engineers.

Some of these results have already been published,† but in these publications there have been so many misprints that it seems advisable to present the whole matter anew. The line for which this wire was purchased is about 43 miles in length, and the country through which it runs varies in elevation from about 100 feet above the sea level to at least 2000 feet; one-half lying in a straight line through a country almost level, while the remainder is over the mountains, through which the line runs almost straight, surmounting high hills and descending into deep gulches. In some cases the length of the poles was proportioned to decrease the vertical line deflection, but as an accurate preliminary survey was not available, much less grading of poles was possible than would have been desirable. This defect in pole setting was largely counteracted in the wire stringing by drawing a number of plans at one time, so that at depressions and elevations there was very little up or down strain put on the wire when it was first tied to the insulators. The standard pole used was of square-sawn redwood, 30 feet in length, 7 inches square at the top, and tapering to 12 inches square at the butt, or about 11 inches at the ground line 5 feet above the butt. Each pole was gained for three cross-arms 20½ inches on centers, the gains being cut ¾-inch deep, into which the cross-arms were bolted by single ⅝-inch through bolts. The arms themselves were 4x4-inch Oregon pine bored for two pins each, the top and bottom arms being 3 feet in length and the center arm 4 feet. The wires on this system of construction are arranged in a hexagon, each side being 24 inches in length.

This system of construction presents some advantages for three-phase working at high voltages for long lines, especially where the two sets of circuit are to be operated from the same bus bars. If both the wires on each arm are at the same potential, the arrangement of each circuit is that of an equilateral triangle, each side being 41 inches, while the minimum distance for leakage between any two wires of different phases is 36 inches of cross-arm and 20 inches of pole, while the length of the longest arm necessary is much less than that in any other system of construction; the pole head is symmetrically loaded, and for these reasons the pole construction is exceptionally stable under all stresses.

The insulators used were a flat-topped glass, triple-petticoat type, about 5 inches in height and 7 inches in diameter, with a wire groove of about .35 inch radius. The insulators are supported by eucalyptus pins of a length to give a distance of 4 inches between the bottom of the insulator petticoat and the cross-arm, eucalyptus wood having been used on account both of its availibility in California for a special pin, and on account of its great strength, which is of extreme importance in the construction of pins of such length.‡ For further insulation and preservation, the cross-arms used were creosoted by a treatment in which the timber was at first dried carefully and then injected with ten pounds of dead oil of coal tar to the cubic foot, an operation requiring approximately thirteen hours for its completion, while the pins were boiled at a temperature of about 225° Fahr. for about eight hours in a compound of coal tar and asphaltum, a treatment which gave a better external surface than the creosote. This latter coating did not penetrate the wood materially, but after experimenting extensively with temperatures up to 225° Fahr. and pressures up to 160 pounds per square inch, without effecting an appreciable penetration of this wood, either with creosote or other extremely fluid materials, all idea of the use of a penetrating compound was abandoned, and an endeavor made to obtain a coating which would provide the most complete external protection.

On this line as erected the arms were braced by a bent angle iron brace, but this precaution seems now to be entirely unnecessary, and a subsequent line, belonging to the Yuba Power Co., erected on much the same plan, is not braced at all. For arms of over 5 feet in length a brace is certainly advantageous, though it is the opinion of the writers that for high potential service the braces should be of wood mortised into the cross-arms and nailed to the pole face.

The above complete physical details of the construction are unnecessary for the discussion of aluminum line wire, though it is believed that its stability when erected depends upon a careful study of all such conditions.

The line as erected carried only four wires, arranged on the top and bottom cross-arms, thus taking their location at the corners of a rectangle 24 inches on the short side and 41 inches on the long side. This arrangement was adopted for the purpose of making temporary use of some two-phase machinery which was in place and underloaded, allowing certain new customers to be taken on quite a year in advance of the contemplated completion of a three-phase plant for which the pole line was really designed.

It was at first feared that this arrangement of the wires would result in inductive disturbances between the phases, as the wires took their positions in the diagonally opposite corners of a rectangle, in place of the corners of a square, as is necessary for complete absence of mutual induction, but the anticipated trouble was not found. Careful measurements were made with one phase short circuited, and the other carrying about 20 amperes with a periodicity of 60 cycles per second, both with a Weston 75-volt voltmeter a Rowland electro-dynamometer, with the result that no deflection was observable on the voltmeter, while the current read on the electro-dynamomometer amounted to only about .001 ampere, the resistance of the dynamometer being 25 ohms and of the line 90 ohms. Only one additional question of installation needs attention, which is the presence on the tops of the poles of a barbed wire stapled to the wood of the pole and grounded at every fourth pole by a galvanized wire leading down along the pole and soldered to an iron plate 18 inches square and ⅛ inch thick, set in the pole hole immediately under the foot of the pole itself. This wire was intended as a lightning guard, and it has apparently done very effective service in discharging the line in all weather.

(TO BE CONTINUED.)

* Abstract of paper read at the seventeenth general meeting of the American Institute of Electrical Engineers, Philadelphia, May 16, 1900.

† "Tests and Calculations on a Forty Mile Aluminum Transmission Line," F. A. C. Perrine, Pacific Coast Transmission Association.

‡ Tests of a considerable number of pins made of eucalyptus, oak and locust show that the eucalyptus has about 20% more strength than locust and 30% more than oak.

MINING SUMMARY.

ALASKA.

Vessels still leave for Cape Nome crowded to the safety limit, and leaving behind freight and passengers impossible to take. The Klondike hegira of '97 is outdone. In San Francisco everything in the way of "Cape Nome outfit" is prominently advertised. The rush will continue through June.

N. R. Smith, deputy land and mineral surveyor at Cape Nome, is down from there, coming out over a new land route. He left Nome March 16th, went on foot with one companion across the country from the Kuskoquim river to Katmai, a coast port on the mainland, opposite Kadiak island; left Kuskoquim river on April 10th, dropping the dog team which they had used on the trail from Nome, to allow a thorough survey of the country.

Katmai was reached May 8th, and in bidarkas, a variety of canoe in use by the coast Indians, the two took the open water to Kadiak, thence by steamer Bertha.

Mr. Smith says: "People on the outside can not realize the extent of the valleys, beach, tundra and mountains included in the Nome district; the area of the country in which rich strikes have been made extends 70 miles back from the beach at Nome and 270 miles east and west. Gold has been found in creeks prospected north to Cape Prince of Wales. Fully 3000 men spent the entire winter in prospecting and locating claims.

"A strike on Ungalaltolik going 80 cents to the pan was reported in February. This is east of the Norton bay country. The two creeks which have been opened so as to give a fair idea of their real character are Bryan and McKinley, between Golovin bay and Norton bay. Other strikes and locations have been made in the Anaconda district.

"Old Russian workings have been found in the Golden Gate district. Quartz has been found on the Kusrikne, a tributary of the Ammain river, flowing into Graneley harbor, in the Port Clarence district.

"To the north among strikes may be mentioned discoveries on Mint and Grouse creeks in the Arctic district, back of Port Safety. Just before I left lots in the town were selling for $2000. It is expected that Port Safety will be the salt-water entrance into the Cape Nome country. Last year there was a great amount of goods lost or destroyed through lightering it ashore to the beach at Nome; it is a tiresome and costly job.

"A peculiar feature of the platting of the Nome townsite occurred this spring. The Anvil district had already organized as a municipality and a regular board of trustees was appointed to look after the little town's affairs. The surveyors who were platting the Nome townsite took in all of Anvil, two square miles, and labeled it as a part of Nome. Anvil had already platted streets, located and disposed of town lots, had town officials at work, but is now what could virtually be called a prisoner within the limits of Nome. It is all called Nome, but there are perhaps yet two sets of city officials, one looking after the affairs of Nome and the other after the interests of what they yet term Anvil.

"Lumber when I left Nome was selling at $500 per M., and even at that figure there was a great demand for the article. The MINING AND SCIENTIFIC PRESS sells at $1 per copy.

"Interest is shown in the Penny River district. The old mouth of Anvil river is said to have formerly made its way to the sea, and is thought to lie somewhere near where the Penny river makes its way through the tundra; and if such is the case, rich diggings will be found there.

"The ruby sand along the beaches has been found to contain gold. The clay deposits also contain gold, and in places the strata are from 4 to 5 feet in width.

"Quartz strikes have been made all the way from Norton bay to Cape Prince of Wales.

"Developments on Tundra this spring have shown that that section will eventually produce gold; that the tundra has been built up by the action of the ice. The dirt and silt which forms that section has been worked away from the mountains and foothills to the beach, where it has been gradually packed and worked back by the action of the ice floes, which enclose Bering sea from the outside world during the long winter. The action which eroded the dirt from its original resting place in the mountains has also worked out with quantities of gold, and this is the gold found in the tundra at the present day."

The weather conditions at Nome since the last advices were unusually favorable. During February the thermometer averaged from 7° to 34° above zero; March 12th it was 10° below.

The Alaska bill makes no change in the mining laws as regards location by power of attorney. The United States mining laws are extended to the district of Alaska. The beach between low water and the tundra is made subject to regulation by the miners themselves, provided such rules and regulations do not conflict with the general mining laws. The Secretary of War has jurisdiction below the low water line, but may not grant an exclusive franchise for dredging to any one party or corporation.

The conferees on the Alaska code bill this week reached a complete agreement, the mining provisions being so adjusted that miners may continue to mine between high and low tide and to dredge under the bed of the ocean according to rules to be provided by the Secretary of War and on condition that they are citizens or have declared their intention of becoming citizens.

At 4 P. M., June 6, a message from the Senate announcing the passage without amendment of the House bill to extend the gold land laws of the United States to the District of Alaska was greeted with applause.

H. I. Willey, formerly Surveyor-General of California, has gone to Cape Nome, with an outfit of machinery and supplies, to be used in working 360 acres of placer ground owned by the Emanepac M. Co., of New York.

The current monthly report from the Alaska-Treadwell, on Douglas island, shows 46,419 tons ore worked by the two mills, the one of 300 stamps running twenty-nine and three-fourths days and the one of 240 stamps eight and one-third days. The ore yielded $95,237. There were 839 tons sulphurets served, valued at $35,116, making the gross earnings for the month $130,353. The expenses were $31,500, making net proceeds $98,853. The ore averaged $2.95 per ton.

ARIZONA.

COCHISE COUNTY.

The body of copper ore in the Spray mine, one of the Copper Queen group at Bisbee, is asserted to be the richest that company has ever found on its property.

GILA COUNTY.

C. F. Lucas, at Ray mines, has the contract to do all the work on the company's mines, and will put on sixty men. The Ray Co. will start their mill this week.

The Black Warrior Copper Co., Amalgamated, is building a reverberatory furnace in place of its ten-ton refining furnace; the new reverberatory can also be used for refining. The company has made a strike of sulphide ore on the Gold gulch property, west of Black Warrior, at the water level. The ledge is 16 feet wide; the ore is black sulphide, and pyrites of copper, the right kind for making acid. Forty men are building a road to the Gold gulch property.

MOJAVE COUNTY.

W. Mellarkey and party of miners have gone from Randsburg, Cal., to the Sheep-trail mine, 35 miles from Kingman. Mr. Mellarkey has the superintendency of the mine; the others will work there.

YAVAPAI COUNTY.

Carl Kurtz writes the Courier from Martinez: "I am running the War Eagle mine, down in the Harcouvar mountains. I am shipping ore by the carload to Eastern smelters, and have a 20-stamp mill ordered for the reduction of lower grade ores. Ores in this section carry a high percentage of copper and gold, and ledges are large. We will have a railroad through here in about a year."

Kurtz says when he first started in on these properties he paid $5 per barrel for water delivered on the ground, but within two miles he expects to be able to develop sufficient water for a 20-stamp mill at the present dry season. He says he counted sixty-three claims in that district that could produce shipping ore if the owners could get the ore out for any reasonable freightage.

The Gilbert correspondent of the Prescott Prospect says: "The Saginaw Lumber Co. is running forty tons of ore through its mill every twenty-four hours. It is the intention of the company to add fifty stamps. There is plenty of water on the property for all purposes."

Courier: Work has begun on the Gray Eagle mine, three miles from the Crowned King.—A bar of refined gold, weighing 180 ounces, from Minnehaha Flat, came from the Button mine, ore run through the Button mill.——The mill of the Penn M. Co. is running steadily, five carloads of concentrates have been shipped. There is talk of doubling the capacity of the mill.——The ore from the Tiger mine, supposed to carry only silver, plated $5 in gold when run through the Tiger mill—enough to pay all expenses. Ten more stamps will be added to the mill.

YUMA COUNTY.

Men are at work building a dredger boat for the Advance G. D. Co. of Colorado Springs, which owns a deposit of gold-bearing gravel in the Potholes district, 12 miles above Yuma, on the Colorado river. The dredger will cost $30,000.

The King of Arizona mine now employs 100 men, a steady gold producer.

CALIFORNIA.

AMADOR COUNTY.

F. Hutchins and W. A. Newcum are developing a copper proposition at Ranlett.

At the Lincoln mine ore is being taken from the 500 north drift.

A strong company has been organized to work the Toman property, adjoining the South Eureka on the east.

BUTTE COUNTY.

(Special Correspondence).—Except in the matter of dredging enterprises along the Feather river, there is a lull in mining development here. Probably this condition of affairs is temporary, as there is undoubted merit in the quartz locations which abound in the mountain region.

The Banner ledge, 4½ miles northeast of Oroville, is a slate formation. Work on the ledge in this location has been discontinued. The company is developing the Amosky quartz vein. The incline shaft is down 450 feet on the vein. Thirty men are pushing development. A tramway will be built from the mouth of the shaft to the 40-stamp mill which formerly reduced Banner ore. The mill will be started as soon as connections can be established with the Cherokee water system. About 2 miles of ditch, flume and tunnel will be put in to get this connection. The work will be completed in September. Then a larger force will be put into the mine. The Banner is an English corporation, whose interests are well attended to in Oroville by Lindsay Scrutton, superintendent. I. Trenberth is foreman of the mine.

The Gold Bank quartz mine at Forbestown employs more men at the present time than any other mining enterprise in Butte county. There are seventy-five to eighty men on the payroll of the company. The growth of the Gold Bank has been evolutionary in its character. Its beginnings were small, its accretions have been gradual, and we now see the survival of the fittest in its system of ore reduction. The buildings are on the mountain side, in deep Ford ravine. The collar of the shaft is nearly 800 feet below the surface croppings of the ledge at the crest of the hill. The shaft runs down on the ledge (at an angle of 30°) to a depth of 400 feet. Here connections have been made with an upraise from lower workings. This upraise is one of the longest in the State—1200 feet—and has few parallels in the history of mining. It was started from a crosscut tunnel, which extends from the ravine to the ledge, a distance of 1260 feet. First put through as an air shaft, this upraise is now being enlarged to a two-compartment shaft, and drifts are being run at the various stations established. When it is considered that the ledge in the Gold Bank an average thickness of 10 feet, the extent of development by means of this upraise may be realized. From the surface croppings of the ledge to the level of the tunnel 2400 feet of vein matter has been penetrated by shaft and upraise. The management is certainly warranted in enlarging the crushing capacity of its mill. Work under the superintendence of Millwright Wm. Powning of Grass Valley has been begun on a 20-stamp addition, which will make sixty stamps in all. Few additional men will be needed in the mine to supply the enlarged mill, as the ore breaks readily. The chlorination plant will be able to handle without enlargement the increased quantity of sulphurets, and as little additional help will be required in the mill the average cost per ton of reducing the ore product will be materially lessened. The motive power at hoist, mill and air compressor is water, under heads of 175, 225 and 350 feet, respectively, the compressor being located in the ravine, below the mill. Compressed air for drills in the mine is now taken through 4000 feet of pipe. Later the pipe line will extend from the mouth of the tunnel to the workings above, and can thus be shortened. Water for power purposes is supplied by the Feather Water Co., 180 miners' inches being used. There are six main and several auxiliary water wheels in different parts of the works, it being the practice of the company to run no two classes of machinery from the same wheel. After being hoisted the ore is dumped upon grizzlies and the coarser part goes through a Gates rock breaker. Then it is run 450 feet in cars over a tramway to the mill. The value is largely in concentrates. Besides sixteen Frue concentrators in the mill, the tailings are run over two sets of blankets. The chlorination plant has a capacity of four tons per day. The present mill crushes 320 tons of ore per month. A small dynamo generates current for lighting the mill and grounds by electricity. The Gold Bank was one of the first mines in the State to inaugurate this feature, having installed a lighting plant in 1892. The Gold Bank mine is owned by the Stow estate. H. P. Stow of Forbestown is manager, Vanderlyn Stow of San Francisco is secretary, L. B. Johnson assistant superintendent, L. G. Hampton foreman, Ed Martin and James Hampton shift bosses, E. W. Herrin assayer and foreman of chlorination works. At present the activities at Forbestown are almost entirely dependent upon the Gold Bank mine.

The old town of Cherokee will ere long assume an aspect of activity. The Spring Valley hydraulic mine, which was closed down through injunction proceedings several years ago, will, through permit from the Debris Commission, resume operations. Ground has been broken for a restraining dam in Dry creek, several miles below the diggings. There is here an ideal dam site. By means of a barrier 16 feet high and 1720 feet long the tailings from the mine can be spread over an immense area of the company's own land. The dam will be constructed of brush and tailings now on the ground. It will be 80 to 100 feet wide at the base, narrowing to 16 feet on top. A spillway 80 feet wide will be cut through a solid lava bank at the side of the dam. The Dennison Contracting Co. of San Francisco will construct the dam for the new Spring Valley Co., which is composed of Pittsburg, Pa., business men, the leading stockholder being A. W. Mellon of the banking firm of Mellon & Sons. The company owns an excellent water system, purchased with the mine, the water being diverted from streams at elevations of 5400 and 3400 feet above sea level. There will be a fall at the hydraulic monitors of 350 feet. That portion of the old diggings known as the Sugar Loaf will be hydraulicked. The gravel stratum under Table mountain will be worked by the drift process. The restraining dam should be completed, according to contract, the fore part of August. L. J. Hohl is present superintendent of Spring Valley, C. Helman foreman of mine, A. Hiller accountant. The Dennison Co. is to receive 15 cents per cubic yard for building the embankment; 24 cents per cubic yard for excavating spillway; extra haul, 2 cents per cubic yard for each 100 feet; paving spillway, 60 cents per square yard.

Oroville, June 5.

CALAVERAS COUNTY.

The Poorman mine, at Glencoe, is reported taking out good ore in an 8-foot vein in north level and between 5 and 6 feet in south level.

P. Deidesheimer, the mining promoter, is working the Masterson property, near San Andreas.

The Melba mine, at Chili Junction, has resumed. K. Whitfield has charge.

EL DORADO COUNTY.

At Grizzly Flat, Brown Bros. of Oleta have bought the Mt. Pleasant mine.

FRESNO COUNTY.

The Kern River Co.'s oil well No. 1 at McKittrick is now free of sand, and pumping 150 barrels per day. The oil is forced through pipe to the station, 3 miles away.

KERN COUNTY.

A new pump, operated by compressed air, is to be tried in the Kern River oil oil fields. It is claimed that the compressed air piped and let down into the oil will drive up oil, sand and all contents of the well.

LOS ANGELES COUNTY.

In the really earnest development of the petroleum resources of the Newhall district, the Pacific Coast Oil Co. in the Pico canyon section has about sixty oil wells on 160 acres. The company is reported as being assessed for 3000 acres. Its operations outside of the Pico canyon are chiefly in the Wiley canyon, 6 miles from Newhall.

At San Pedro the Dodson Oil Co. will sink a well. The Oil Era says: "The oil fever is strong along the coast, and practically the entire shore from Long Beach to Redondo is reported tied up for alleged oil prospecting purposes."

MONO COUNTY.

Bridgeport Chronicle-Union: The Jackson, Lakeview and May Lundy mines at Lundy have passed into the hands of a Colorado company, the old Supt., R. T. Pierce, being kept at the helm. Mr. Pierce has let a contract for 400 large tamarack poles for an electric line, the new company intending to run the works by electric power. The cyanide plant commenced work this week, and a new tunnel, 2700 feet in length, is to be run.

NEVADA COUNTY.

A representative of the Risdon Iron Works, San Francisco, last week visited Grass Valley and Nevada City for miners to go to Hawaii. Twelve were engaged for $3.50 per day and board and expenses to their destination.

Messrs. de Sabla, Grow, Hotaling, Martin, Pierson, Sutro and Linforth have incorporated the Bay Counties Power Co.,

capital stock $5,000,000, to buy and combine the Nevada County and the Yuba County Electric Power Cos. and supply sundry places with light and power.

Eastern men have a bond on the Work and Pay gravel mine, east of Nevada City, for $25,000. They intend to put in modern machinery and sink to the main channel.

ORANGE COUNTY.

The Union Oil Co. is reported to have struck an oil gusher in Brea canyon at a depth of 365 feet.

The Golden West Crude Oil Co. is drilling at Fillmore, in charge of A. Ward.

SAN BENITO COUNTY.

Several oil companies are operating in the Panoche district.

One hundred men are employed in the quicksilver mines at New Idria.

A quicksilver mine is being opened near Emmett.

SAN BERNARDINO COUNTY.

The foundation is being laid for the proposed new smelter at the Needles.

SAN DIEGO COUNTY.

Near Oceanside, the Copper Queen mine has been sold to an English company formed in San Diego.

SANTA BARBARA COUNTY.

The Ocean View Co., in the Casitas district, has struck oil sand at 250 feet. Prior to reaching the oil sand, 50 feet of blue clay was passed through. Before stopping 18 feet of oil sand was bored.

SHASTA COUNTY.

(Special Correspondence).—The Evening Star mine, in Old Diggings district, is shipping ore to the smelter at Keswick. There are seven men employed at this mine.

The Texas Con. mine at Hart made a five-carload shipment of ore to the Keswick smelter. Woodrow & Bush are operating this property and employ thirty-five men.

At the Black Spider mine, near Keswick, sinking the shaft and drifting continue. The former is 140 feet deep and the drift is about 120 feet long. Sixteen men are employed.

The Reed mine, in Old Diggings, has reverted from the bonders to the owners, and work is in progress. The property comprises six claims.

The Mt. Shasta mine, near Shasta, has again resumed ore shipments and sinking is in progress. The shaft is about 340 feet deep.

Adjoining the Central mine at Whitehouse, which has long been idle, the Joshua Hendy Co. are working the Old Spanish mine, which was long abandoned.

The Little Providence, near Whitehouse, at 35 feet depth, has opened a 6-foot ledge that averages $5 a ton.

The Minnesota, near Copley, and the Dry Creek Slide mine, near Keswick, operated by D. McCarthy, are both producing ore.

At the Bennington, near Iron mountain, Williams & Bunker have completed a tramway siding and ore bunkers and will soon be shipping ore over the Mountain Copper Co.'s road to Keswick. They have fifteen men employed.

Redding, June 5.

Democrat: The company that has been working the Uncle Sam mine, near Kennet, for some months past, under a bond, have ceased operations and the men that have been employed are discharged. Since the company took the bond on the Uncle Sam work has been continued in the mine and from ten to twenty stamps dropping all of the time. Good ore has been milled and new bodies of ore have from time to time been uncovered. The bond will expire on July 1st, this year, and, as the company can not secure an extension, they will consequently cease operations. The Uncle Sam profited the Sierra Buttes Co., its former owners, something over $1,500,000. They ceased operations on the property at a time when the mine showed a weakening, or did not continue to pan out such big returns. The mine never has "petered out" in the strict sense of the term, and some one will yet get hold and reclaim it as a great gold producer.

SIERRA COUNTY.

M. Barnhart is at Alleghany arranging for a 20-stamp mill on the Red Hill mine.

SISKIYOU COUNTY.

Yreka Journal: E. D. Baker, working the Cherry Hill quartz mine on Cherry creek, lately bonded for $25,000, found a body of ore with sufficient in sight to pay first installment of $10,000. He has twenty men employed.

TUOLUMNE COUNTY.

Near Quartz, the Dutch mine is running its 20-stamp mill, hoist and rock breaker with electric power.

The reorganization committee of the Santa Ysabel G. M. Co. has issued a circular to the stockholders, stating that it has been organized, under the laws of Colorado, to acquire their properties, and inviting them to surrender certificates by June 9th to its treasurer, and at the same time pay him $1 for each share.

The Arrow, north of Soulsbyville, is under bond to Chas. Fair of San Francisco, and ore is being developed.

Near Carters, the Neale, or Sugarman, in ten days of May yielded 600 ounces gold. The mine is worked by Watson Bros., and is owned by J. Neale, Sonora, Cal.

The Grand View gravel mine, near Jamestown, has resumed operations. C. E. Ayers is Supt.

Independent: A $10,000 pocket was taken out this week at J. H. Neale's mine on Bald mountain. A few weeks ago a gold seam was struck in the tunnel and several hundred dollars extracted. Work was continued and an upraise was run on the gold seam. The vein widened out and the rich bunch of gold was encountered. The tunnel has been driven in 800 feet. The present yield aggregates 550 ounces.

The Densmore Con. G. M. Co., directors A. Hayward, C. D. Lane, L. W. Shinn, C. W. Fox of San Francisco and J. P. Hopkins, capital stock $200,000, will work the Densmore mine, under superintendency of Mr. Poundstone.

COLORADO.

BOULDER COUNTY.

(Special Correspondence). — The Cold Spring G. M. & T. Co., composed of Illinois men, are driving the Craig tunnel, on the Bordeaux, to tap their properties at greater depth. They will build a mill at the mouth of the tunnel.

The Slide is at present worked mostly by leasers, who are all making wages.

The old Prussian mine, owned by Mr. Newhouse, has made a new strike.

The Nugget mine, a free gold proposition, has completed arragements to build a 10-stamp mill.

The management of the Lucky Star is sinking the main shaft and have a 2-foot streak of shipping ore.

The Golden Eagle has opened up some tellurium ore.

Gold Hill, June 4.

Manager W. B. Bailey expects that the sampling works of the Eldora chlorination mill will be ready for operation June 15.

CLEAR CREEK COUNTY.

The Republican reports that the old Senator mine at Dumont has been sold to New York men for $100,000, who have let a contract to the Colorado Iron Works for a concentrating mill, to have an initial capacity of fifty tons every twenty-four hours, operated by water power. Rolls and Bartlett tables will form the equipment. In addition, a Finlayson tramway 2300 feet long will connect the mine with the mill. The ore will be handled automatically.

DOLORES COUNTY.

"Fifty miners can secure employment in the Rico district at once," says the Rico News-Sun.

GRAND COUNTY.

In the vicinity of Red Cliff mining on Battle mountain is progressing. At the Iron Mask mine the lower sulphide streak was found again by sinking a winze at the old pump station in the incline, hundreds of feet from the original strike. The carbonate belt is getting bigger. The Newhouse tunnel is making headway. The mine is under the management of F. F. Harrington.

J. T. Hart at the Percy Chester Con. is employing twenty-five men.

Manager Porterfield at the St. Joe has the mine drained, laterals cleaned and has opened a body of sulphide in the breast.

GUNNISON COUNTY.

Near Ohio City Supt. Sinclair has eighteen men at the Chloride. The ore runs $100 per ton and the property is shipping regularly, the ore being hauled to the D. & R. G. and shipped to the Pueblo smelters.

Supt. Roe has ordered a hoist for the Cortland. A compressor is to be added.

The Pittsburg-Gunnison Co. is operating its Granite Mountain property. Manager Wilson is also working the West Point, a property which he recently bonded and leased.

Peterson & Mosely have sold their lease on the Eureka mine, on Lake hill, Gunnison mining district, to D. C. Tobin of Leadville. He will employ twenty men. He has a bond upon the property from the owner, the American Smelting Co. of Leadville, for $25,000. The mine has shipped about 2000 tons of lead carbonate ore running $30—a favorite ore, as the smelters do not charge for treating it.

The Tomichi Valley smelter at Cosden is a success and will handle nearly all the ore from the Tomichi district.

At Vulcan the hoister selected by Dr. Weiss for the Good Hope mine weighs 14,000 pounds. It is 10x15, guaranteed to sink to a depth of 1000 feet.

LAKE COUNTY.

O. C. Bartholomew, manager Sedalia mine, Leadville, reports two new strikes in the drift from the 700-foot level. The ore now being taken out runs from $6 to $12 gold, $2 to $4 silver and 7% to 10% lead, making an average of about $18 per ton.

General Manager Duvall of the Boston Gold-Copper Smelter, near Leadville, will enlarge the plant.

Manager Estey of the Rialto M. Co. will drain the Pyrenees shaft. The pump will raise 900 gallons a minute from a depth of 1000 feet.

Leadville Miner: The Banker shaft has reached the 1100-foot point, has been sunk nearly through the hard quartz porphyry and a softer gray porphyry has been encountered in which bunches and seams of sulphide ore are being found. Many of the largest bodies of gold ore in the camp are found at the junction of two different kinds of porphyry.

OURAY COUNTY.

Near Ouray the Ouray H. M. Co. has struck ore running $50 to the ton.

Work is about finished on the new mill for the American Nettie, near Ouray.

Several men are at work on the Calliope. The Chicago purchasers have $40,000 for development work.

The Hammond Tunnel Co. has sixteen men at work. The tunnel is in 1000 feet; 10 feet are worked every day.

PITKIN COUNTY.

Manager Palmer in his quarterly report on the Argentum-Juniata shows that in the mine (a low-grade proposition depending solely upon the price of silver) the milling ore produced during the quarter has averaged $1.74 per ton gross higher value than that of the last quarter, resulting in a small net profit over operating expense. The cost of mining, milling and shipping has averaged $5.05 per ton gross of milling ore, as against $5.46 for the last quarter, the lower cost being principally due to the greater tonnage mined and milled during the quarter.

SAN MIGUEL COUNTY.

C. Bullock has in Denver two gold bars from the plates of the Butterfly-Terrible mill at Ophir, weighing 166.63 ounces, valued at $2400. He employs forty-five men, turning out fifty to sixty tons a day. The vein averages 2 feet in width. The ore is stamped by the rapid drop system.

TELLER COUNTY.

The output of gold from the mines of the Cripple Creek district for May was $2,000,000.

The Consolidated Mines Co. paid $20,000 to the Alert Co. for its lease on the Diamond and Harwood claims of the Damon Co.

The Legal Tender has closed down its workings to give opportunity to enlarge the shaft, put in a bigger plant and make other improvements which shall make possible larger production.

The Times-Citizen says the Logan is to have a 24-drill compressor and a new 22x36 hoist, good for a depth of 3000 feet. ——The Longfellow is to have a hoist 16x30, good for a depth of 1500 feet.——In Poverty gulch a hoist 20x30, good for a depth of 2000 feet, and a compressor have been ordered.——The Woods shaft on the Morning Glory property is down 700 feet. From bedrock up almost to the collar of the shaft the timbering has been surrounded by a masonry wall of granite.

The Elkton, Raven and Tornado stockholders have ratified the purchase of the Raven and Tornado mines by the new Elkton Con. Co. Stockholders of the Raven Co. received 625,000 shares of the Elkton Con. stock; the Tornado stockholders received 625,000 shares of the Elkton Con. stock. The Raven and Tornado companies turn in all their assets to the new company, the Raven Co. having $40,000 and the Tornado Co. $50,000. The Elkton Co. contributes its treasury balance of $162,149, so that the new company starts out with $252,149 in its treasury. The Elkton Co. has increased its capitalization from $1,250,000 to $3,000,000.

IDAHO.

BEAR LAKE COUNTY.

The Bear Lake Copper Co., capital $1,000,000, has been incorporated in Lewiston; the property is in Bear Lake county. The ore body exposed, 25 feet in width, carries copper value of 5%; assays also show $3 in gold per ton. Owing to the proximity of the property to Salt Lake City it is figured that the ore can be delivered at the smelter in that city for $4.50 per ton.

IDAHO COUNTY.

(Special Correspondence).—The name of the Esperanza M. Co. is to be changed to the Laymance M. Co.

M. D. Hall of Stanford, H. H. Harvey of Berkeley and S. K. Bradford of San Francisco are working the Republic properties. The ore has an average value of $15; a cyanide plant will be put in.

Elk City, May 29.

G. I. Porter, Mgr. American Hill placers at Elk City, says the American Hill, Buffalo Hill and Ternan Hill placers are being operated successfully. On the American Hill the hydraulic elevator is running satisfactorily; he is running two giants and working ten men. He has opened up ground where the gravel is from 40 to 100 feet in thickness. The quartz has a greenish cast, and was first supposed to contain copper. Mgr. Hunt is reticent. A peculiarity of the May Day is that the gold and silver ores also carry a high percentage of lead, making them a desirable product.

SHOSHONE COUNTY.

In the Cœur d' Alenes the average daily prouction from ten leading producers is figured as follows:

	Tons.
Bunker Hill & Sullivan	1,000
Morning	700
Frisco	750
Standard	700
Tiger-Poorman	500
Mammoth	300
Hunter	200
Last Chance	200
Hecla	150
Silver King	60
Total	4,560

Of this 4560 tons, says the Wallace correspondent of the Spokesman-Review, but a small part is shipped in the shape it comes from the mine. The Last Chance and Silver King are the only mines where much attention is paid to crude shipments. The great majority of it goes through one of the mammoth concentrating plants of the district, and by the time it is ready for shipment the weight has been reduced to 700 or 750 tons.

The value of ore from the different mines varies so widely that it is hard to determine the average, but the net profit for each ton will probably not be far from $8. To mine, mill, haul and smelt the ore costs about as much more.

Aside from the Sixteen to One, which will soon resume operations, and an increase a little later of from 25% to 50% in the output of the Hecla, there is little likelihood of any considerable increase in the daily product this year. Several new properties will probably ship, but it will be on a small scale, affecting the aggregate but little. By the end of the year there should easily be 5000 tons mined daily, but unless there are new discoveries made it will not greatly exceed that.

WASHINGTON COUNTY.

Weiser reports 200,000 pounds of peacock copper ore freighted to the terminus of the Pacific & Idaho Northern Railway at Cambridge from the Blue Jacket mine. This ore is shipped by team over 60 miles and then by rail to New York City for treatment. The new Seven Devils Railway is completed to Cambridge, 40 miles from Weiser.

MONTANA.

FLATHEAD COUNTY.

The Choteau M. Co. has organized to operate the Choteau and Silver Standard mines on Cable creek, headquarters at Libby; W. A. Hillis, secretary and treasurer. The Choteau is an extension of the Silver Cable; the values are in gold, silver and lead.

Near Libby, at the Snowshoe mine, the main tunnel is in 2000 feet, and has yet to be driven 900 feet to get through the mountain. Shipping ore is taken from the No. 4 tunnel and men are at work in every opening.

JEFFERSON COUNTY.

The New Elkhorn M. Co., W. S. Kelley Supt., has sold its property at Elkhorn to George H. Piatt of Helena for $9000. The sale includes the four quartz claims of the company, twenty-five acres of ground located as placer, the millsite, certain lots in the town of Elkhorn, the mill and other buildings, and the water rights of Elkhorn and adjacent creeks, flumes, ditches, etc. The price is in noticeable contrast to that paid for the property when it was purchased by the English company from Holter and others in 1888, the price then being $1,000,000, of which $500,000 was in cash. It was a high-grade silver proposition and for several years it paid large dividends; in fact, it is currently stated that the mine paid for itself in the first three years of operation by the new company. In working the property the incline shaft went down 2300 feet, causing a considerable expense in handling the ore and in pumping water. The ore became less rich, silver went down in price and it was finally concluded by the company to cease working the property. This was done a few months ago. The machinery was shipped away and the mine was allowed to fill with water, which it did up to the 900-foot level.

MADISON COUNTY.

At Pony the Garnet G. M. Co.'s mill is in operation. The company contemplates a tunnel near the bottom of the incline, or will sink a shaft and put in a hoist and

pump. Mr. Wood, the resident manager, favors the former plan.

T. Lewis, foreman Madisonian mine, Sheridan, says he has begun sinking a three-compartment shaft from the 300-foot level, to go 200 feet deeper.

SILVER BOW COUNTY.

O. B. Peck, who did some costly experimenting in Nevada, has bought the Blue Bird 10-stamp battery and will experiment further on the Butte low-grade silver ores.

Last Saturday Judge Knowles of the United States Circuit Court handed down his decision in the case of the Colusa-Parrott Co., owned by W. A. Clark and the Anaconda Co., controlled by Marcus Daly. The suit hinged on the question of a union of the veins of the Colusa-Parrott and its connection between the 800 and 1000 levels of the mine with those of the Anaconda. The suit was to recover ore that the Anaconda people had extracted from the part below the alleged union. The court finds for the Anaconda Co., holding there are two distinct veins.

The Anaconda C. M. Co. has cancelled all its mining leases and will hereafter operate its own properties.

NEVADA.

EUREKA COUNTY.

The Zanoli mine at Safford, 6 miles west of Palisade, is sold to S. H. Gibson of Salt Lake City for $50,000. The mine carries silver, gold, lead and copper, and has been shipping ore for three years. The sale includes about 800 tons of ore now on the dump.

LINCOLN COUNTY.

At Searchlight, Gen. Mgr. H. R. Bacheller of the Quartette M. Co. has stopped work and gone to Mexico.

James McFarlane, manager of the Homestake and other properties at Deer Lodge, says that he will have the mill in operation within the next thirty days, and that he will handle at least 150 tons of ore daily. He expects to show an average of $20 per ton.

At Searchlight, work at the Quartette Co. mines is progressing under the direction of Supt. McReady.

NEW MEXICO.

SANTA FE COUNTY.

New Mexican: "The Edison experimental placer plant at Dolores is running continuously, but none of the employes lets his left hand know what his right hand doeth, as it were. A high fence has been erected about the works in order to bar out the curious."

SIERRA COUNTY.

The Porter mill at Hillsboro has closed down for repairs.

A pocket of 1600-ounce silver ore is found in the winze below the 100-foot level of the Log Cabin mine, Tierra Blanco.

SOCORRO COUNTY.

T. J. Fleeman has a mine at Kelly that carries 60% lead ore and thirty-five ounces silver to the ton.

The Little Fannie at Mogollon will erect a 40-stamp mill.

The Last Chance mine at Mogollon has four carloads of machinery. The company is running the tunnel an additional 100 feet.

The Silver Bar mine at Mogollon will sink its shaft another 50 feet. The monthly output will be 150 tons.

TAOS COUNTY.

At Rinconada the Copper Hill M. Co., J. K. Turner manager, has sixty-five men at work. The company—New York capitalists—has spent $200,000 on the group. The electric plant recently constructed has been started and the mine, mill and camp are illumined by electricity. Four air drills are in operation. A 6-mile pipe line of 7-inch pipe has been constructed at a cost of $30,000.

OREGON.

BAKER COUNTY.

In the Diadem mine, at Sumpter, Supt. Grimes reports a strike at a depth of 400 feet, indicating permanence of the ore body.

In Greenhorn mining district gold gravel is reported yielding $5 nuggets.

UTAH.

JUAB COUNTY.

Tintic Miner: The May Day strikes have come from practically one stope opened up to 100 feet below and 40 feet above the tunnel level. In the "gold stope," on the 100-foot level, a vein of quartz was struck last week, which has varied in size from 1 to 4 feet, which gave the following values from samples taken across the face:

No. 1—Lead, 22½%; gold, 68.46 ounces; silver, 268.5 ounces.

No. 2—Lead, 26%; gold, 69 ounces; silver, 231.2 ounces.

No. 3—Lead, 28%; gold, 91.56 ounces; silver, 1473.5 ounces.

SALT LAKE COUNTY.

Bulletin: Tallies of haulers and shippers show the output of Bingham during May was nearly 10,000 tons. Of this over 7000 tons came by wire tram from Highland Boy. The output of May is fully 2000 tons greater than that of any previous month in the history of Bingham.

TOOELE COUNTY.

The Tribune announces the consolidation of the Mercur G. M. & M. Co. and DeLamar's Mercur Mines Co. The name of the company under the reorganization will be the Con. Mercur Gold Mines Co.; capitalization, $5,000,000, in 1,000,000 shares, 200,000 shares to be held in the treasury; the proportion of interest, two-thirds for the DeLamar Co. and one-third for the Mercur Co. Capt. J. R. DeLamar is slated for the presidency and J. Dern for the vice-presidency. The DeLamar Co. puts in the Golden Gate group of twenty-one claims, 143 acres; the Brickyard group, ten claims, 101 acres; the Merritt group, three claims, 59 acres; various other groups, embracing twenty-seven claims, the Dalton property with all appurtenances, and the Golden Gate mill. The Mercur people put in the Mercur group, thirteen claims, 153 acres; the property at Manning, including the Mercur mill, water rights, claims and all appurtenances. The Golden Gate plant consists of a fire-proof mill, built throughout of steel, the leaching room of which is over one-sixth of a mile long. It contains nine straight-lined roasting furnaces 120 feet long by 12 feet wide each. The entire plant is run by electricity, and all the machinery is of the latest design and thoroughly automatic in operation. The mill is considered the largest cyanide plant in the world, of a capacity sufficient to treat 1000 tons daily. The hoisting works is run by electricity. The total surface improvements on DeLamar's Mercur mines have cost about $875,000. There will be seven directors, of which the DeLamar interest will have four and the Mercur interest three.

WASHINGTON COUNTY.

In the Dixie copper mine, 18 miles from St. George, the vein is in limestone, traced for 6000 feet on the surface, crossing a gulch and entering the granite, where it is lost. The present working is 175 feet wide. The tunnel, after passing through 200 feet of limestone, enters the vein. Assays show 8% lead, six ounces silver and 14% copper to the ton.

WASHINGTON.

OKANOGAN COUNTY.

Near the town of Silver, in the Lily mine, is reported a strike of ore at a depth of 185 feet, assaying $10.20 gold.

SNOHOMISH COUNTY.

The Everett arsenic plant, building at the smelter, has 1500 feet brick flues, through which the smoke from the arsenic and sulphur bearing ore in the roaster passes to the 120-foot brick stack.

STEVENS COUNTY.

The Northport smelter capacity is to be doubled.

WYOMING.

W. G. Emerson and associates say they will build a large matte smelter at Grand Encampment, and, as a preliminary, have deposited $100,000 in a Denver bank. The smelter is to handle the product of the Ferris-Haggerty copper mine.

FOREIGN.

BRITISH COLUMBIA.

In the Kamloops country the Iron Mask has been sold to the B. C. Exploration Syndicate.

At the annual meeting of the Payne Con. M. Co. of Slocan the manager said: "At present we are drawing our principal ore supply from the stopes between levels Nos. 3 and 4; stopes over No. 5 have not yet been opened. The ore product for the months of February and March has been lower grade than usual, mainly because it has come from the western part of the ore chute, where the silver values, per unit of lead, are lower than the average. During the coming year I believe the ore will average ninety ounces silver per ton and 15% lead. The production should exceed 1000 tons per month. The ore reserves are fully as large as when you took over the property, and are better opened up."

It was explained that the ore would net $57 per ton, or $57,000 per month, which, less $15,000 for working expenses, leaves $42,000 net profit monthly.

From October, 1896, to June, 1899, the Payne paid dividends to the amount of $1,100,000, created a surplus of over $200,000, and paid the original owners for the property.

The King Solomon M. Co., the property of the Canadian Pacific Co., is in charge of A. D. Wesbey.

At the War Eagle the ore bins destroyed by fire last week are to be built closer to the big hoist, so as to save the tramway connecting the bins with the hoist. They are to be double the capacity of those destroyed. The gravity tramway will be extended 90 feet farther up the hill. There are sixty-five men at work.

The contract system on the War Eagle and Center Star is a success and is being extended.

For the month ending May 15 the cleanup of the twenty stamps at the Cariboo, Camp McKinney, mill amounted to 1446 ounces. The concentrates run on an average about $1500 per month and are shipped to Trail for smelter treatment.

MEXICO.

Torreon men have formed a company to establish a smelter at that point. J. Schram, of the firm of Schiess & Co., is the manager.

J. M. Wilson, former manager Garduno M. Co., Puerto del Oro, Guerrero, on the State line between Guerrero and Michoacan, says that several good copper finds have recently been made in that vicinity. The Garduno Co. has a 16-stamp mill in operation.

THE KLONDIKE.

The first party from Dawson by steamer May 19 say the Klondike cleanup was well under way when they left and would reach $20,000,000. From all the creeks reports were that the cleanup would be 50% greater than last year.

Personal.

GEORGE H. EVANS has returned from Boston to Breckenridge, Colo.

WEST HOLLISTER is now superintendent President mine, Leadville, Colo.

HAMILTON SMITH is in San Francisco. He will return to London about Aug. 1.

CHAS. J. BUTLER is mine superintendent Iron-Silver mines, Leadville, Colo.

J. T. DONAHUE has resigned the superintendency of the Mammoth, Utah, mine.

CHAS. J. MOORE, of Cripple Creek and Leadville, Colo., goes to London and Paris.

A. F. WUENSCH has returned to Leadville, Colo., from a tour through California, Arizona and Mexico.

CHAS. H. MEUSEL, hydraulic engineer for the Horsefly, B. C., M. Co., has returned to Oakland, Cal.

L. F. J. WRINKLE, of Inyo county, Cal., has been chosen professor of mining and civil engineering at the Nevada State University.

OSCAR SZONTAGH, who is succeeded by A. H. Brown, has returned from the De Lamar properties, Shasta county, Cal., to Salt Lake City, Utah.

W. H. HILE, Supt. Last Chance G. M. Co., Weaverville, Cal., is in San Francisco. His company is building a 12-mile ditch and has 100 men at work.

T. A. RICKARD has the position of controlling engineer on the Independence property, Cripple Creek district, Colo. Jno. Stark is mine superintendent.

S. M. HAMILL has been elected president of the Siemens & Halske Electric Co. of America, of Chicago, which was recently acquired by the General Electric Co.

AT the Cariboo mine, Camp McKinney, B. C., J. P. Keane, for the past two years Supt., has resigned. P. Cunningham, former Supt., succeeds him. The former goes to Wardner, Idaho, where he has a contract for running a long tunnel.

Recently Declared Mining Dividends.

Mammoth M. Co., Utah, 5 cents per share, $20,000	June 7
Empire State, Idaho, M. & D. Co., 3%	June 15
Swansea, Utah, M. Co., $10,000	June 10
Madison G. M. Co., Colorado, 3½ cents per share, $35,000	June 15
Tamarack M. Co., Michigan, $7 per share	June 29
Calumet & Hecla M. Co., $10 per share	June 28
Golden Eagle M. Co., Leadville, Colo., 1 cent per share, $5000	June 1
Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	June 4

Commercial Paragraphs.

FLINT & LOMAX of Denver, Colo., recently made a shipment of dynamos and amalgam plates to Cape Nome, Alaska.

A TON of Cape Nome auriferous sand was received last week at the ore-testing works of Henry E. Wood, Denver, Colo.

D. HUG, manufacturer of the Hug water wheel, at Denver, Colo., is putting in two wheels, aggregating 450 H. P., for the Georgetown Light & Power Co., at Georgetown, Colo.

THE S. H. SUPPLY CO. of Denver, Colo., who recently dismantled the Holden Lixiviation Works at Aspen, Colo., the Beam Process mill, Empire, Colo., the Grant mill and Denver White Lead Works, Denver, have sent to their warerooms in Denver fourteen carloads of material from the Aspen Works, besides four carloads of wooden tanks which were shipped to Parral, Mexico.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING MAY 29, 1900.

650,502.—STEEL WATER GATE—J. Bouse, S. F.
650,638.—WHEEL HUB—G. M. Dixon, Sacramento, Cal.
650,673.—ORE CONCENTRATOR—W. G. Dodd, S. F.
650,753.—WASHER—A. B. Gibson, Polk county, Or.
650,754.—ENVELOPE—C. A. Gruenhagen, Creston, Cal.
650,584.—WINDOW SHADE HOLDER—T. Harding, San Jose, Cal.
650,536.—MANNITE SUBSTITUTE—A. Hough, S. F.
650,509.—PUMPING ENGINE—H. Kessler, S. F.
650,606.—SHAFT COUPLING—I. LaGrange, Los Angeles, Cal.
650,794.—ADVERTISING DEVICE—G. W. Maxwell, Los Angeles, Cal.
650,563.—WATER FILTER—I. E. Morris, Oakland, Cal.
650,415.—VEHICLE HUB—P. B. Page, Fresno, Cal.
650,567.—CHECK HOOK—O. I. Roberts, Tomales, Cal.
650,590.—CABLE GRIP—A. Rosenholz, S. F.
650,732.—PICTURE CABINET—L. S. Sanborn, Davenport, Wash.
650,521.—SASH LOCK—Shaw & Spaulding, S. F.
650,571.—GAS ENGINE—H. Swain, S. F.
650,626.—SAWMILL SET WORKS—Wood & Lachapelle, Houquiam, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DUPLEX PUMPING ENGINES.—H. Kessler, San Francisco, Cal. No. 650,509. Dated May 29, 1900. This invention relates to improvements in pumping engines of that class known as duplex engines, in which the movement of the piston of one of the engines is utilized to actuate the valve of the other. It consists in a mechanism by which the effect of the steam may be compounded in engines of this class which have no shaft or flywheel, and comprises the combination of high and low pressure cylinders, and steam distribution valves therefor, with means whereby the high pressure valve is controlled by the movement of the low pressure valve and vice versa. Passages connecting the exhaust of the high pressure cylinder with the steam chest of the low pressure cylinder, together with an equalizer controlling the pressure between the high and low pressure steam chests, and steam connections between the equalizer and said chests.

STEEL WATER GATES.—J. Bouse, San Francisco, Cal. No. 650,502. Dated May 29, 1900. This invention relates to improvements in gates of that class which are designed to control the flow of water under pressure or otherwise, and the object of the invention is to provide for an improved and lighter construction, with means for dismounting the parts to reduce the weight for transportation. It consists in forming the upper and lower members of angle or channel iron with means for uniting the meeting edges of the members, and sides formed of sheet metal and riveted to the members. These separable sheet metal sections have openings and flanged tubular extensions whereby the casing may be secured in a line of conducting pipe, an annular valve seat surrounding the opening upon one side, and a valve adapted to close against the seat, a screw shank or stem extending through a stuffing box in the casing having one end connected with the valve and the other passing through a turnable nut whereby the stem is reciprocated to open or close the valve to reduce the friction and make the parts movable as freely as possible under pressure. Roller bearings are fitted between the nut and flanges against which it is turnable, the rollers being retained in position by a ring.

Latest Market Reports.

SAN FRANCISCO, June 7, 1900.

SILVER—Per oz., Troy: London, 27⅝d (standard ounce, 925 fine); New York, bar silver, 60c (1000 fine); San Francisco, 60⅛c; Mexican dollars, 49⅛c.

COPPER.—New York: Lake, 1 to 3 casks, 16.85 cash; carload lots, 16.50; Electrolytic, 1 to 3 casks, 16.75; carload lots, 16.35; Casting, 1 to 3 casks, 16.50; carload lots, 16.25. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.00; Salt Lake City, 3.90; St. Louis, $3.95; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 7, sheet 8, bar 6c. London, £17=3.70c per lb.

The schedule of prices issued by the American Smelting & Refining Co. is as follows:

Delivered.	Desilverized.	Corroding.
St. Louis	$3 95	$4 05
Chicago	3 95	4 05
Cincinnati	4 00	4 10
Pittsburg	4 05	4 15
Philadelphia	4 05	4 15
New York	4 00	4 15
Boston	4 07½	4 17½

SPELTER. — New York, $4.45; St. Louis, $4.55; San Francisco, ton lots, 6c; 100-lb lots, 6c.

ANTIMONY. — New York, 10c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON. — Pittsburg, pig, No. 2, foundry, $20.00; gray forge, $18.50; San Francisco, bar, per lb., 3c.

STEEL. — Billets, Pittsburg, $28.00; sheet bars, $32; San Francisco, bar, 11c to 18c per lb.

QUICKSILVER. — New York, $51.00; London, £9 10s; San Francisco, local, $49.50 ℔ flask of 76½ lbs. Export rates withdrawn. Dealers predict sudden advance.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 6c; slab, 6½c; bar, 8c.

SOLDER. — Half-and-half, 100-lb. lots, 20½c; San Francisco, Plumbers', 100-lb. lots, 17c.

TIN.—New York, pig, $28.75; San Francisco, ton lots, 31½c; 1000 lbs., 32c; 500 lbs., 33c; less, 34c; bar tin, ℔ lb, 37c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 33@35c ℔ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 66° B, 2c ℔ lb.; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2½@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 7, 1900.

9:30 A. M. SESSION.

400 Belcher.....22c	400 Mexican.....22c
1200 B. & B.....26c	100 Ophir.....72c
100 Challenge....15c	400 .....71c
800 Chollar.....21c	300 Overman....17c
200 C. C. & V.$1 50	200 Savage.....14c
400 G. & C.....13c	400 Sierra Nev..30c
300 H. & N.....27c	500 Union Con...20c

2:30 P. M. SESSION.

300 Ophir.....71c	300 Justice.....08c
200 Mexican.....21c	100 Union.....22c
100 G. & C.....13c	200 Silver Hill...42c
1000 C. C.& V.$1 50	100 Challenge...14c
200 Savage.....15c	

SITUATIONS WANTED.

SITUATION WANTED,
By Mine Superintendent.
Long experience. Best of reference. Address F. A. WALTER, 2929 Lafayette St., Denver, Colo.

COMPETENT CYANIDE MAN AND ASSAYER open for engagement. Best of references. Also an experienced AMALGAMATOR. Address "South," care Mining and Scientific Press.

WANTED—POSITION AS SUPERINTENDENT HYDRAULIC MINING PROPERTY. Thoroughly qualified in all its branches. Over twenty years' experience. References. Address "Mining Superintendent," care this office.

Situation Wanted by a Millman.
Twenty-two years' experience in California, Mexico, and Central America. Best of references. Address W. S., this office.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

A Large Hydraulic Mining Property For Sale,
Comprising 274 acres and having water rights, ditches, reservoirs, etc. Ground has averaged for thousands of cubic yards of gravel over 22 cents per cubic yard. The property is offered for sale on favorable terms, for the closing of partnership affairs, and in consequence of the death of principal owners. There are no complications; U. S. patents for title. Facilities for restraining dams good; U. S. Debris Commission rights for dams granted. Every facility given for thorough investigation. For further particulars apply to ALMARIN B. PAUL, Agent for Eastern owners, 27 Crocker Building, San Francisco.



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Chemists, Mining and Metallurgical Engineers,
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DENVER, - COLO.
Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

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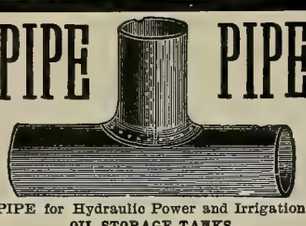
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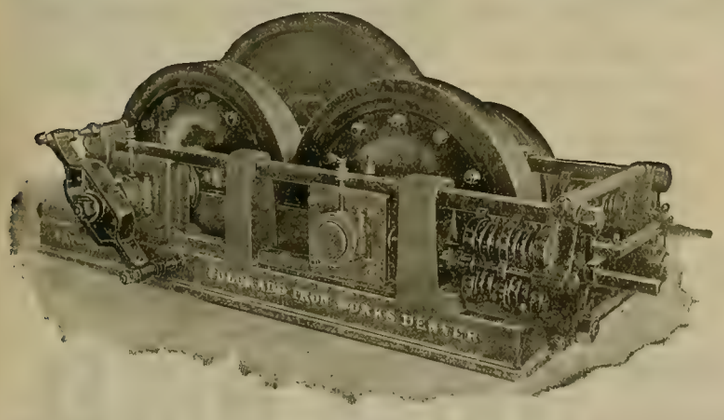
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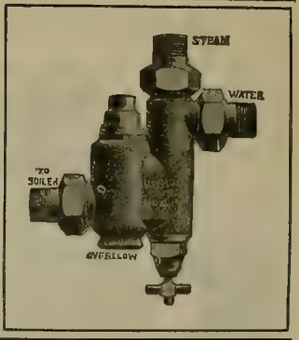
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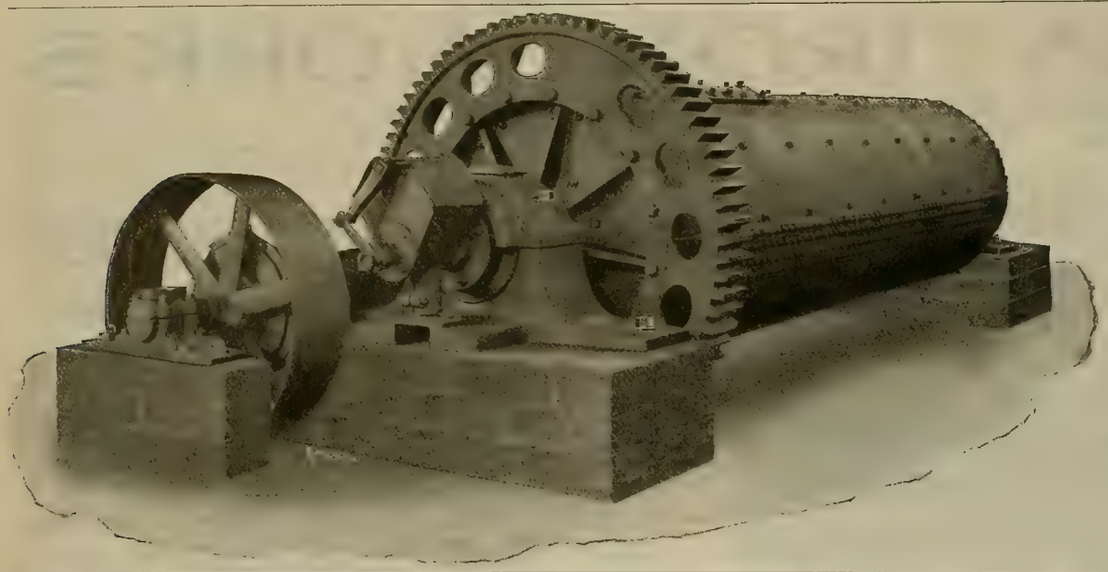
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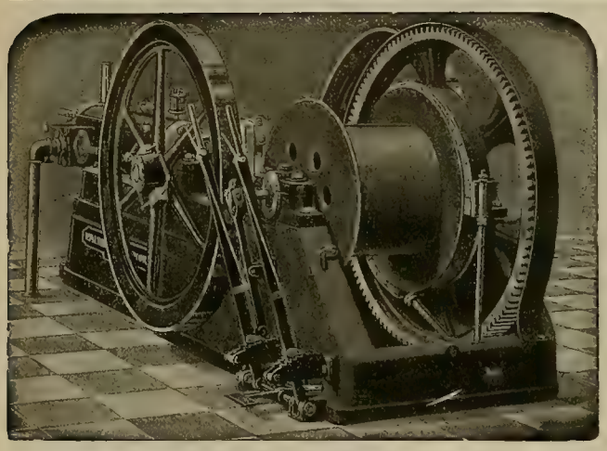
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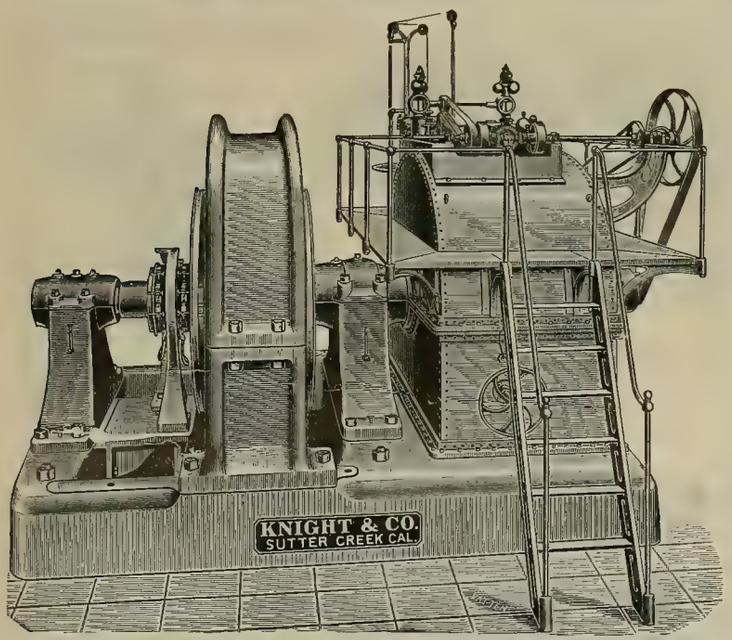
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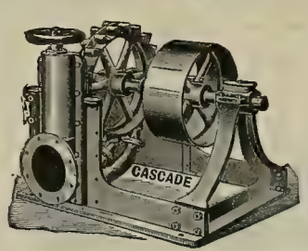
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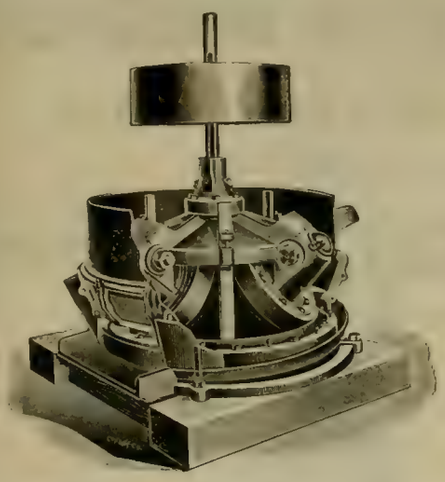
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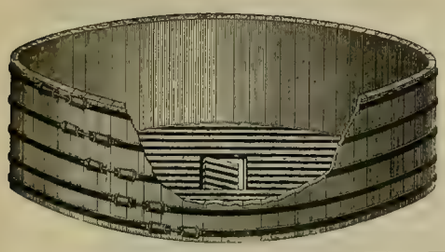
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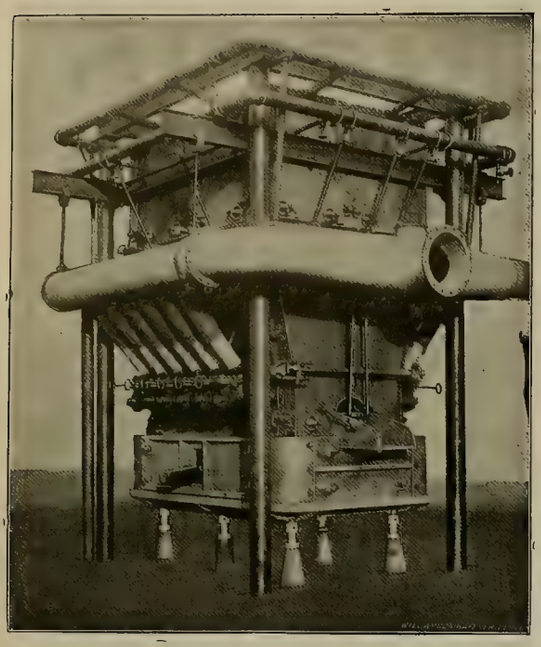
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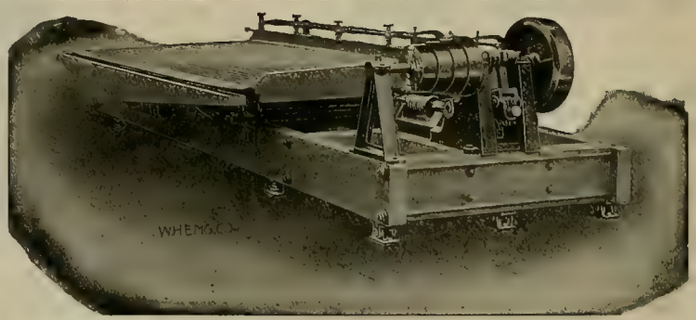
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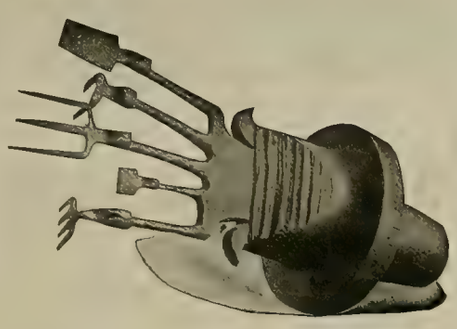


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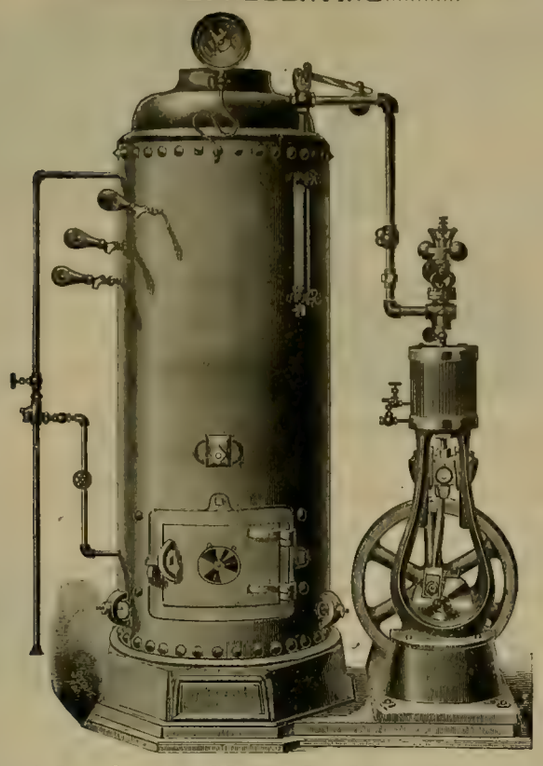
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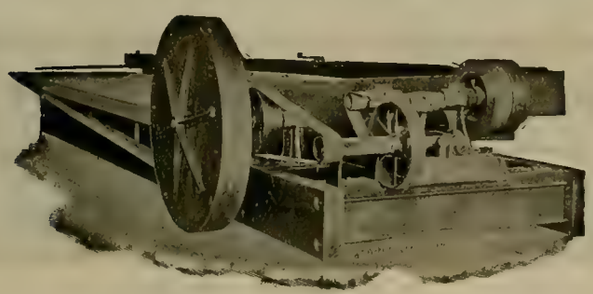
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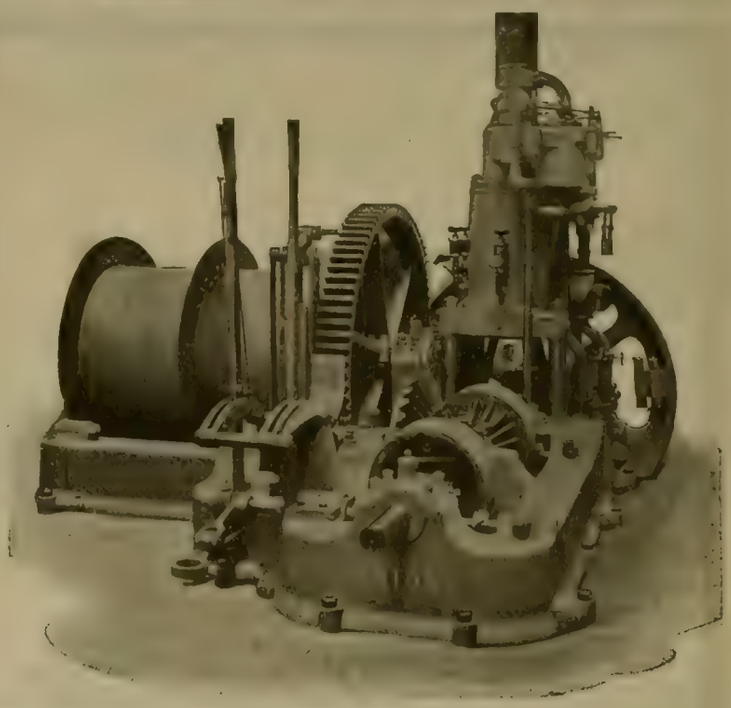
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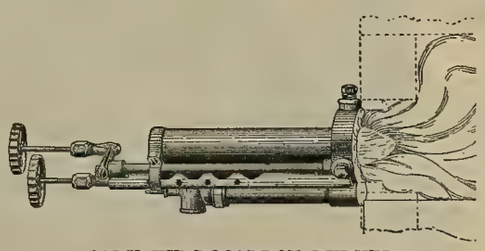
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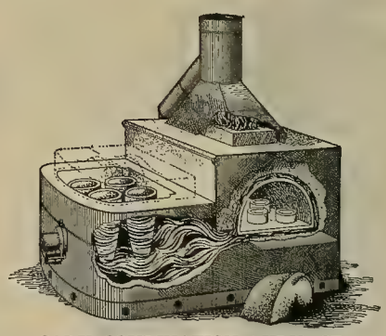
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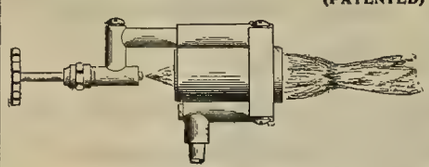
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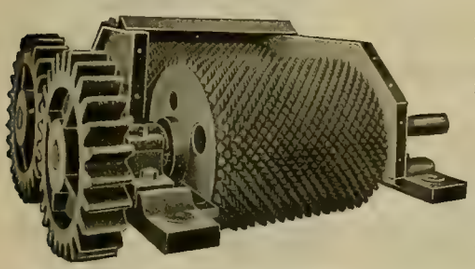
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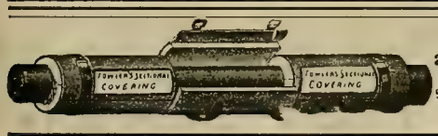


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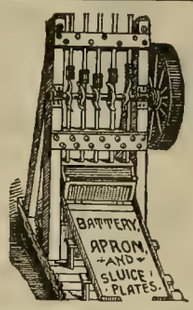
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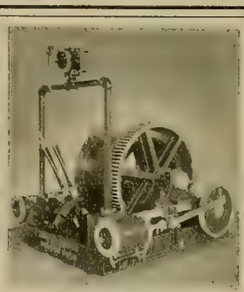
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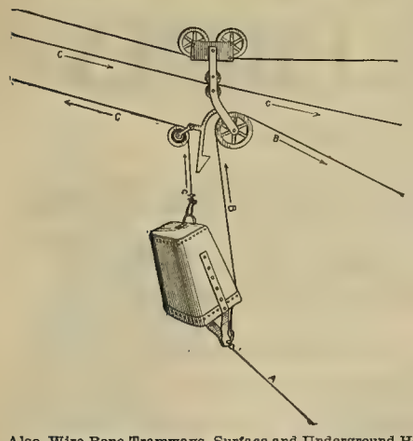


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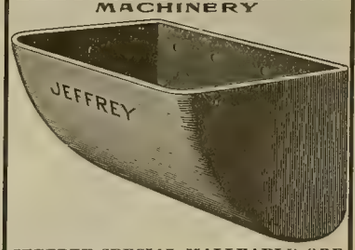
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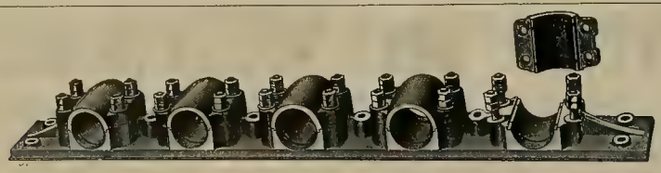


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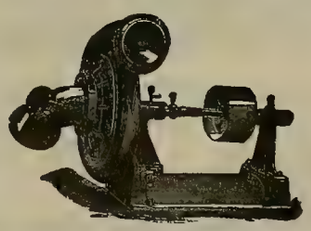
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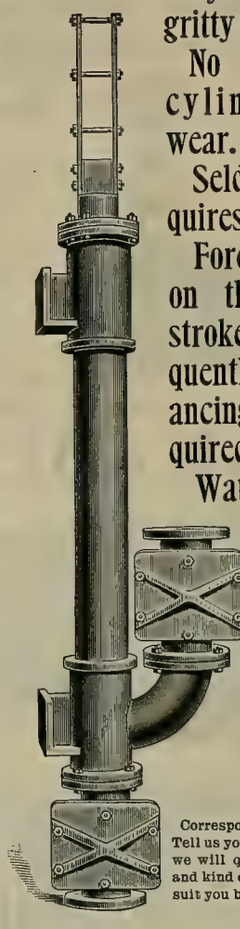
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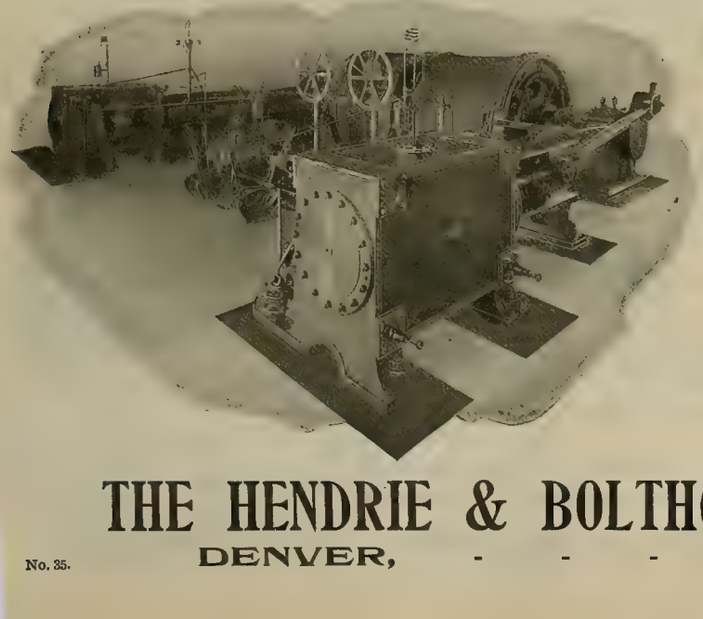
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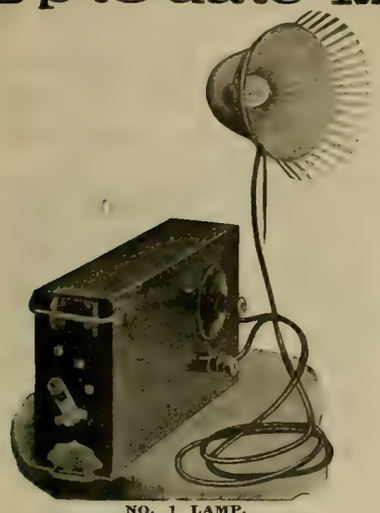
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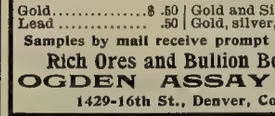
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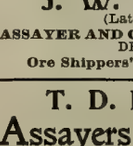
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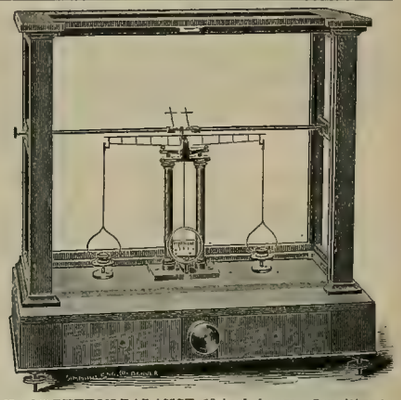
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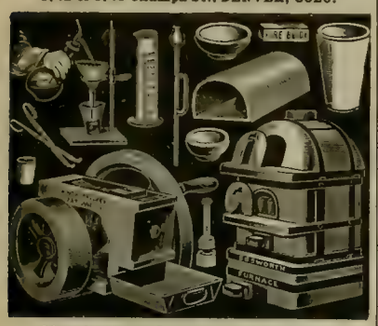
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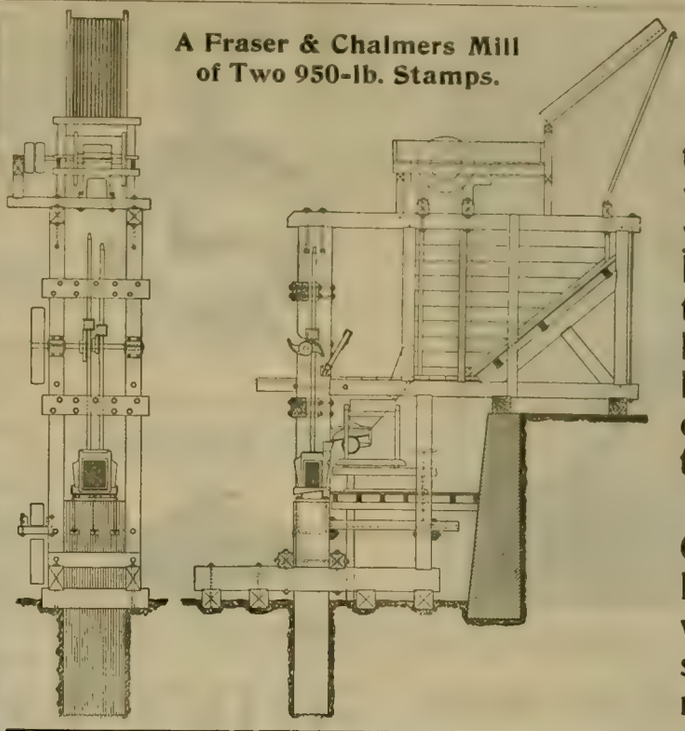
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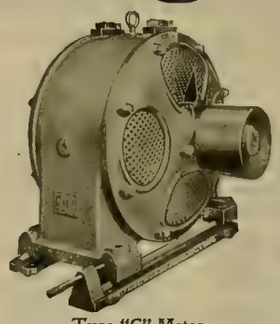
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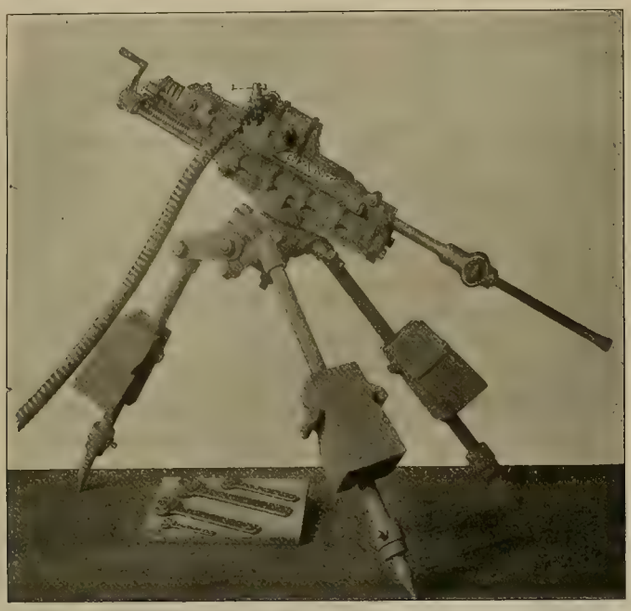
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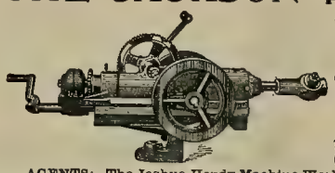
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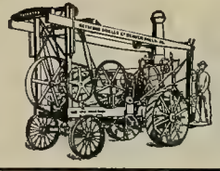


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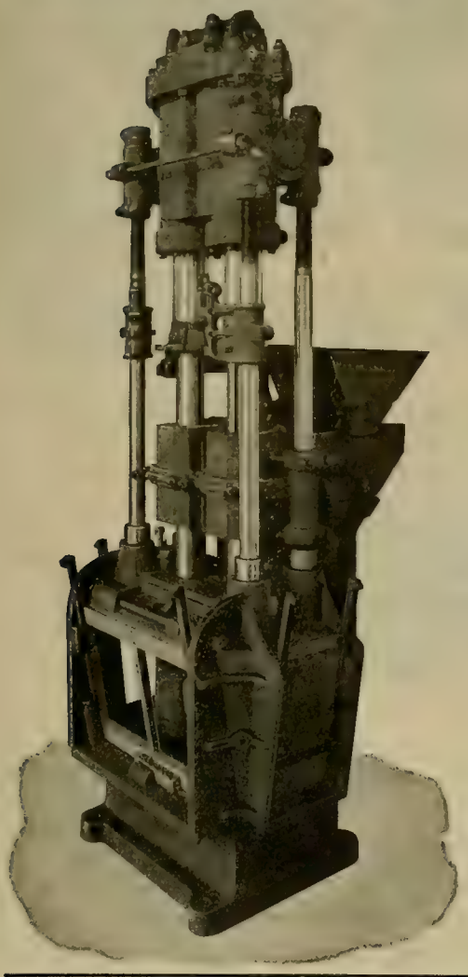
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NICARAGUA, June 20, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

After an experience covering a period of three years with both the first and improved "Tremain Steam Stamp Mill," in every particular I have found it perfection—a money maker, and just the thing for a small capital, while companies organized on a large scale would do well to look into its merits.

I find no difficulty in crushing eight tons of ore per day and running on hard ore. This mill should be a winner.

Very truly yours,

[SIGNED] L. W. ADAMS,
General Manager Murra Gold Mining Co.

Eight Years in Operation Without a Cent for Repairs.

GOLDEN P. O., JOSEPHINE CO., COLO., December 23, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

Our Tremain Mill is giving us good results, and although being in operation since 1892 has not cost us $1 for repairs, and to-day is making 180 drops per minute with 95 lbs. steam pressure.

The ore we are working at present is soft and we mill in 24 hours, using No. 10 slot screen, 15 tons.

Yours truly,

M. C. DAVIS,
Superintendent Sarah Belle Mines.

Running Under Compressed Air in West Australia.

293 ST. GEORGE'S TERRACE, PERTH, W. A., February 6, 1900.

F. R. PERROT, ESQ., AGENT OF GATES IRON WORKS, PERTH, WEST AUSTRALIA.

DEAR SIR: In reply to your enquiry as to the working of the Tremain Mill on the Burbanks Grand Junction, I would state that at the start we worked this from the boiler supplied by the Gates Iron Works Company, but owing to certain irregularities of the running, which were in a measure due to the intermittent supply of ore and the short time that we were able to run it per day, I finally laid on air piping from my air compressor, a quarter of a mile distant, and used the boiler as an air receiver, with the result that I got an absolutely constant run, which, I believe, averaged about 105 drops per minute, and this was kept up with great regularity and showed a much better return in the treatment of the ore. The usual air pressure in this case was 85 lbs., whereas under steam we were not so satisfied with the result as worked at 100 lbs. By this we were also saved in cost the charges of stoker, fuel and water, and it was worked with much greater cleanliness, and during the whole time the mill was running—which was several months—it never froze up on us or showed any signs of trouble in that direction.

The mill is now temporarily stopped, but when it is again started I shall most decidedly continue the use of compressed air.

Yours faithfully,

[SIGNED] GEO. HEWER.

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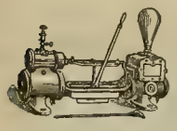
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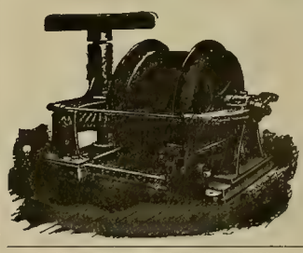
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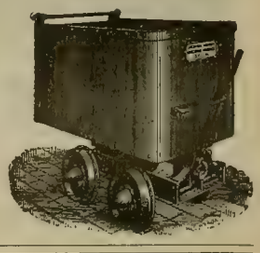
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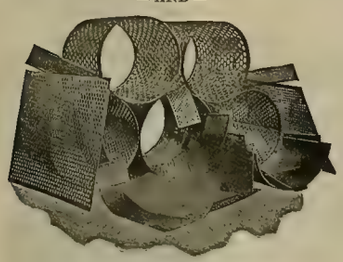
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ASSESSMENT NOTICES.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of May, 1900, an assessment (No. 5) of ten (10c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 11th day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—213 Jackson street, San Francisco, Cal.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of May, 1900, an assessment (No. 25) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 21st day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of May, 1900, an assessment (No. 3) of Two (£2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 310 Pine street, room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of July, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 30th day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—310 Pine street, rooms 36, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of June, 1900, an assessment (No. 12) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of July, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of August, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 23) levied on the 2nd day of April, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. Heckmann, Trustee	64	2,000	$40 00
H. Heckmann, Trustee	65	2,000	40 00
H. Heckmann, Trustee	66	500	10 00
H. Heckmann, Trustee	67	500	10 00
H. Heckmann, Trustee	68	500	10 00
H. Heckmann, Trustee	70	200	4 00
H. Heckmann, Trustee	71	200	4 00
H. Heckmann, Trustee	72	200	4 00
H. Heckmann, Trustee	73	200	4 00
H. Heckmann, Trustee	79	10	20
P. A. Wagner, Trustee	90	980	19 60
William Dieffenbacker	84	190	3 80
William Dieffenbacker	98	200	4 00
William Dieffenbacker	99	200	4 00
William Dieffenbacker	100	200	4 00
William Dieffenbacker	101	200	4 00
William Dieffenbacker	102	100	2 00
William Dieffenbacker	103	100	2 00
G. A. Hinckelbein, Trustee	9	1,000	20 00
G. A. Hinckelbein, Trustee	10	1,000	20 00
G. A. Hinckelbein, Trustee	11	1,000	20 00
G. A. Hinckelbein, Trustee	23	500	10 00
G. A. Hinckelbein, Trustee	32	200	4 00

And in accordance with law, and an order from the Board of Directors, made on the 2nd day of April, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 28th day of May, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

POSTPONEMENT.

The day of sale of the above delinquent stock has been postponed to WEDNESDAY, June 27th, 1900, at the same hour and place. By order of the Board of Directors. CHAS. BOVONE, Secretary.

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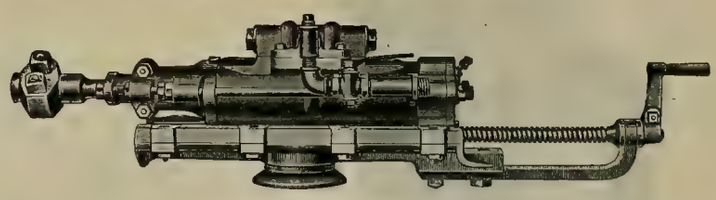
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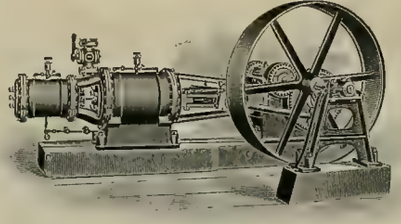
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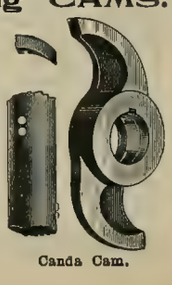
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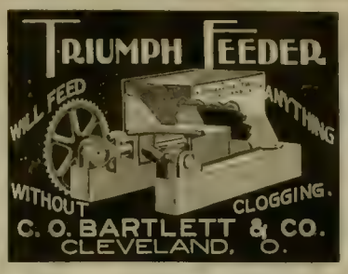


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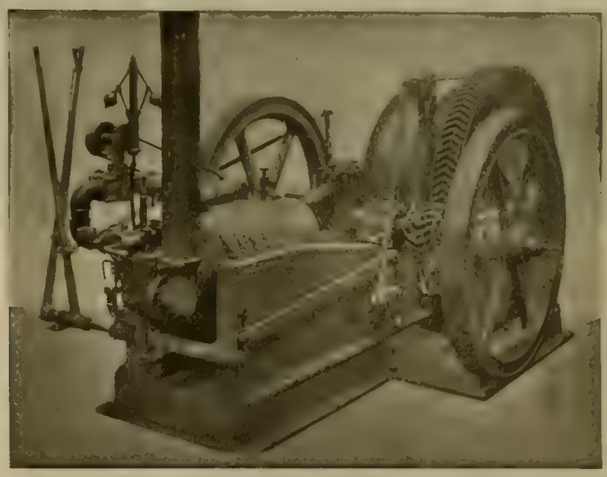


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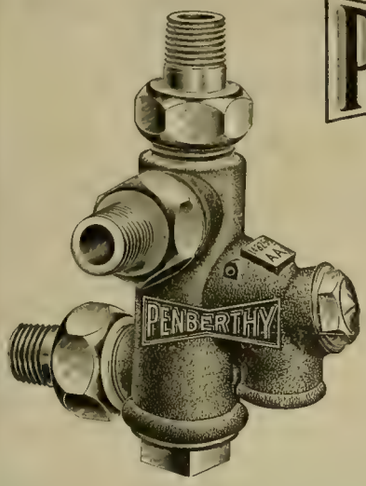
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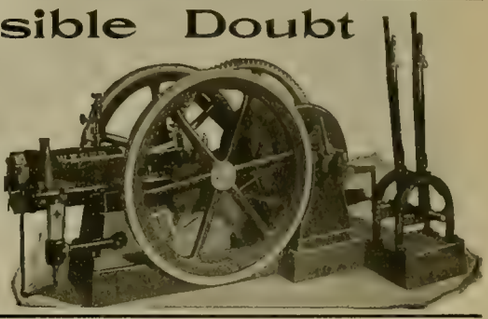
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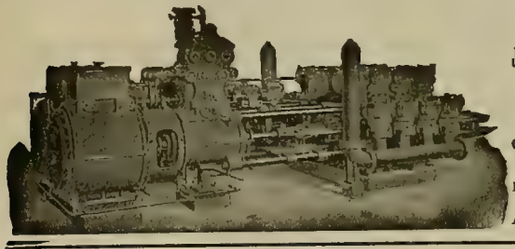
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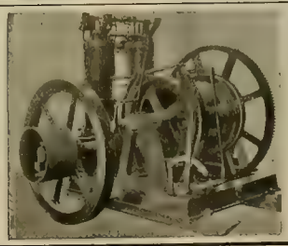
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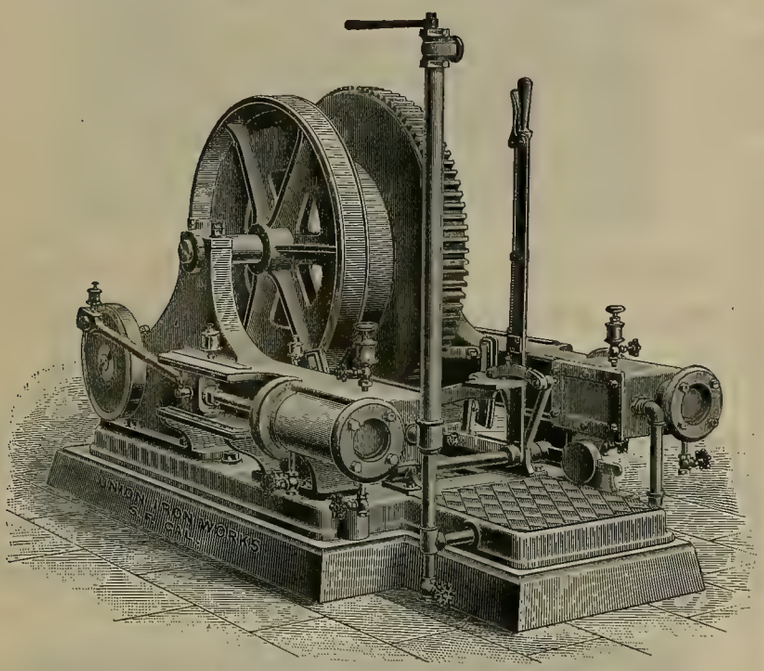
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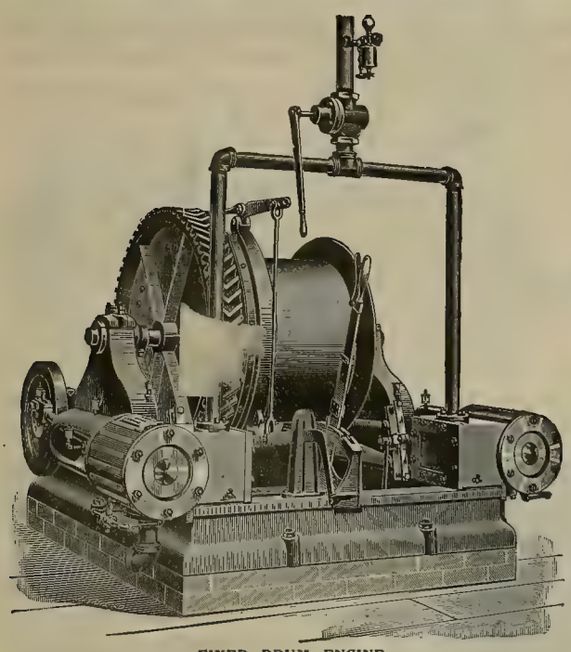
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Affinity and What It Signifies.

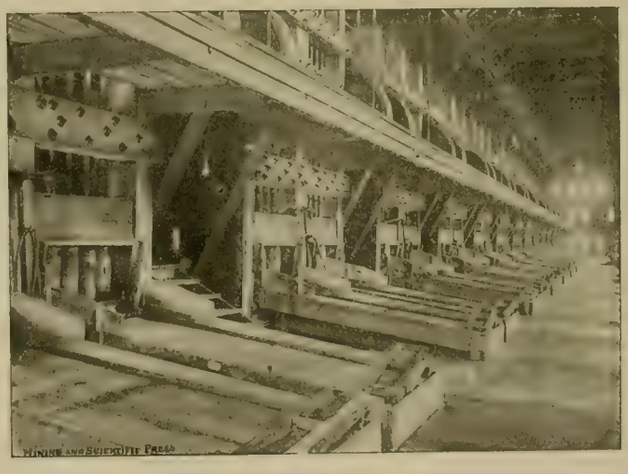
Affinity or chemical attraction is the force which causes the particles of dissimilar kinds of matter to combine so as to form new matter. This definition indicates the differences between affinity and cohesion, which is another modification of molecular attraction. Cohesion merely binds similar particles into a mass; affinity brings about the combination of heterogeneous particles and causes them to lose their individual properties. The change of characters which follows the action of affinity is noticeable. For example, the inflammable metal sodium unites with the suffocating gas chlorine, and the compound thus produced is chloride of sodium, or common salt, a substance which does not bear the slightest resemblance to either of its components. Chemical combinations do not take place indifferently, but in accordance with certain strict rules or laws. One substance will unite with another in preference to a third, or in some cases in preference to any other. This preference is denoted by the term elective affinity. By means of this discriminating action of affinity some combinations may be decomposed. If, for instance, there be a substance (x) composed of two elementary bodies (a and b) which have a slighter affinity for each other than one of them (a) has for a third element (c), then if we bring this third body into connection with them under the requisite conditions, the one (a) which has the greatest affinity for it will leave the other (b) and unite with it to form another compound (y). The decomposition of water by redhot iron illustrates such a case; for if water, which is composed of the elements oxygen and hydrogen, be passed through a tube containing iron filings heated to redness, its oxygen will unite with the iron to form a kind of rust, and its hydrogen will be set free. In every case where one constituent is expelled by a new body, and thus liberated, the decomposition is said to be the result of single elective affinity; but when two substances, each consisting of two constituents, act reciprocally upon each other so as to produce two new compounds, the decomposition is referred to double elective affinity. This double reaction takes place when chloride of phosphorus is thrown into water. The chlorine leaves the phosphorus and unites with the hydrogen of the water to form hydrochloric acid, while the remaining elements, phosphorus and oxygen, enter into combination and produce phosphoric acid. An idea formerly prevailed that the affinity between any two substances never varied, and great labor was bestowed on the preparation of tables exhibiting the precedence of affinities. Modern chemists, however, do not regard affinity as a fixed and regular force, and the tables alluded to are now considered of no use. The attraction of one body for another is greatly modified by the circumstances under which the two bodies are brought together. Alteration of temperature is one of the causes which influence the force of chemical attraction. When metallic mercury is heated nearly to its boiling point, and exposed in this condition to the air for a lengthened period, it absorbs oxygen and becomes converted into a dark-red crystalline powder. But the same oxide of mercury, when raised to a still higher temperature, parts with its oxygen, which leaves the mercury in its original metallic state. Insolubility and the power of vaporization are potent disturbing influences. They interfere in almost every reaction and frequently turn the scale when the opposing affinities are nicely balanced. Thus when a solution of lime in hydrochloric acid is mixed with a solution of carbonate of ammonia, a double reaction ensues; carbonate of lime and chloride of ammonium being generated. This result is brought about mainly by the insolubility of the carbonate of lime. Again, a mixture of dry carbonate of lime and chloride of ammonium, when heated in a retort, gives a sublimate of carbonate of ammonia, while chloride of lime remains behind. In this instance the great volatility of the new ammoniacal salt determines the nature of the decomposition.

What is called the nascent state is one very favorable to chemical combination. Thus, carbon and nitrogen refuse to combine with hydrogen under ordinary circumstances; but when these gases are nascent or newly evolved, as when they are simultaneously liberated from some previous combination, they unite readily. Some remarkable decompositions are referred to a peculiar modification of chemical force, to which the term disposing affinity has been applied. The preparation of hydrogen from zinc affords a familiar example of such decompositions. A piece of polished zinc put into pure water remains perfectly bright for any length of time and manifests no power of decomposing the liquid. On the addition, however, of a little sulphuric acid the metal becomes oxidized and hydrogen is freely disengaged. The acid dissolves the oxide as fast as it is produced, and thus keeps the surface of the metal exposed to the action of the water. This function of the acid is perfectly intelligible; but its decomposing influence, under which the oxide is first formed, is not entirely understood.

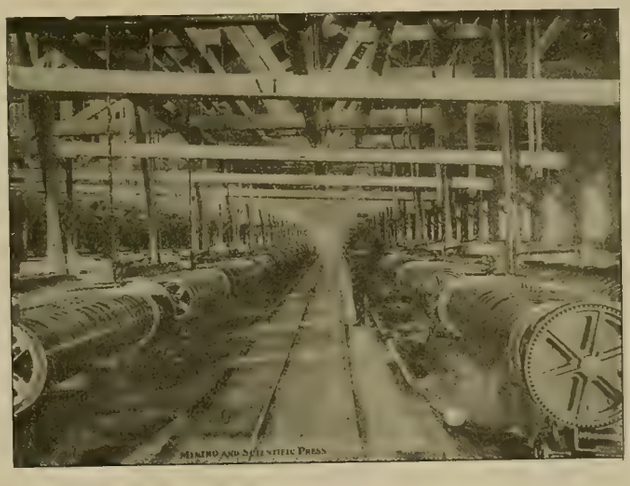
Affinity is generally much stronger between bodies which are very unlike each other than between bodies which are closely allied. Thus, potassium and sodium tend strongly to unite with chlorine and iodine, but the bodies of each pair do not attract one another with sufficient force to enter into combination. The discoveries of Faraday and others have established the fact that whenever two substances unite to form a compound, they are in opposite electrical conditions, one being electronegative, the other electropositive. This and other facts go to prove that chemical affinity is a particular modification of electrical attraction.



300-Stamp Mill, Alaska-Treadwell Co., Douglas Island, Alaska. On the Left are the Chlorination Works; on the Right is the Mill of the Bear's Nest Mine.



Batteries of Stamps — Interior View of the 300-Stamp Mill, Alaska-Treadwell Mine, Douglas Island, Alaska.



Concentrators — Interior View of the Alaska-Treadwell 300-Stamp Mill, Douglas Island, Alaska.

The 300-Stamp Mill on Douglas Island, Alaska. (See page 668.)

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San Francisco, June 16, 1900.

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THE Cape Nome hegira has taken machinists as well as miners. Cripple Creek, Colo., reports difficulty in securing machinists, and the same story comes from Calaveras and other California counties.

A NOTED phase of scientific progress is observable in the commercial changes in the great enterprises that have so served to annihilate time and distance. The business of the Western Union Telegraph Co. has been so cut into and absorbed by the long-distance telephone service, that the former concern has appropriated $20,000,000 to engage in the telephone business on a large scale, and thus recoup some of its recent loss of old time profits. The device that twenty-five years ago was dubbed "a toy," has now over one thousand million dollars invested in its development, and has revolutionized the system of national communication.

AS SHOWN ELSEWHERE, Utah lead producers are organizing to sustain the price of that product. One way proposed there is to ship away the surplus lead. If statistics are trustworthy, the United States' annual lead consumption is 6000 tons more than its production. If imported lead makes such a slump in the market as the recent one, it looks like "seething the kid in its mother's milk" to expect the ore producers to go to the expense of sending it out of the country. Some Utah ore producers are holding their higher grade lead ore in expectation of a rise, which would seem to be more in accord with the law of supply and demand.

AS IN other departments, the tendency in mining appliances is steadily toward automatic working—the replacement of human labor by mechanical devices. The idea is to use a machine for anything that can be done without thinking, and so set men free to work the best part of them—the brain—and to get a higher price for their work thereby. This idea and this inevitable tendency is opposed by many men, who look upon a machine as a rival, and view an automatic device as something calculated to make them "lose their job;" but a broader view of the matter shows that every automatic appliance enabling the American worker to emancipate himself from drudgery done better by a machine, gives him a better chance to develop into a better wage earner.

Head Gear for Mines.

On page 674 is some reference in our special Colorado correspondence to a gallows-frame over the Wolfe Tone shaft at Leadville. A picture of the frame or head gear is given on page 669. On the same page appear pictures of other typical head gear for shaft hoists in different localities. The subject is of practical interest.

It will be noted in the description on page 674 of the Leadville head gear that it is built of redwood, is 82 feet high, and the main timbers are not mortised, being held together by heavy iron bolts. In striking contrast is the head frame of the High Ore mine at Butte, Montana, built of steel, which is superseding timber for such purpose, not rapidly, for miners are conservative and respect tradition and ancient usage; but economy, safety and due regard for engineering requirements militate in favor of the progress of the use of steel in mining operations and the gradual disuse of timber.

Montana mines are replacing wooden frames of massive 24x36-inch timber with such steel head gear structures as that illustrated. The height of that frame is 100 feet to the center of the sheaves; the base is 38x65 feet. The weight of each of the frames complete is 310,000 pounds, which does not include the cast-iron bases or the anchor bolts. In these bases is provided a vertical adjustment by which the alignment of the frame can be preserved in case the ground should settle. The Anaconda Co. state that the head gear mentioned, and illustrated on page 669, is satisfactory in its operation.

Were a picture procurable of some of the simple hoisting equipments of years ago at Leadville they would contrast strangely with the frame illustrated and referred to, now building in the same locality, at the Wolfe Tone mine. On Fryer hill, Leadville, in earlier days, good ore producers were rigged out with simply equipped hoisting works, consisting, so far as the frame was concerned, of a tripod, three poles lashed together, tied at the top, and a sheave wheel at the point of joining. Of course, as depth was attained, those primitive devices disappeared, giving way to more elaborate modern mechanism, made necessary by deep mining.

The engraving of the gallows-frame at the Malvina-Potosi shaft of the Merced Gold Mining Co., near Coulterville, Cal., represents a common type of wooden head frame in Montana, less frequent in California. (The Merced Co. is a Montana organization.) This type of gallows-frame, while not up to the most approved modern idea, is simple and easy to frame and erect. It usually gives satisfaction where prospecting, and later where cages or even self-dumping skips are run. Some miners consider this style of frame to be superior to the four-post frame over vertical shafts, so commonly found in California, for the reason that, ordinarily, the four-post frame has two useless members, being therefore unnecessarily expensive and cumbersome. If the angle brace be set a little to the rear of the line of greatest strain, a line dividing the angle midway between the reel of the hoist and the cable in the shaft would give the desired result. As this is the main compression member, the upright posts need not be as strong as they are usually made; but a factor for safety generally costs but little more than a structure built strictly on theoretical lines, and therefore the miner is willing to pay the slightly greater cost and be on the safe side. The old-time four-post frame still has the call in California, and the traveler through the State will find them building in almost every district. The only innovation in the four-post frame coming to our notice recently is that at the Fremont shaft, near Amador City, Amador Co., Cal., where a frame of 12-inch timbers has been built, minus angle braces—something new.

The illustration of the two-post gallows-frame at Cripple Creek, Colorado, typifies the style of head gear in use there, the side braces attached to give it greater rigidity and the iron rods tieing it to prevent side swaying.

Coming back to California frames, the one depicted as in use at the Oneida mine, Amador Co., deserves commendation, as also the one at Pennsylvania hill, Grass Valley. The Oneida gear is not cumbered with any superfluous material and is jointed with intent to distribute and equalize the strain inevitable on head frames over a shaft in which heavy loads are rapidly hoisted from a considerable depth.

In this, as in all mine methods, there are varying requirements that must be met. The incline, the vertical shaft, the three-compartment affair over productive mines, the more modest needs of the mine that has gone from windlass and bucket to whim, and so to head gear for greater depth, all have their special requirements, and the doctrine of expediency prevails. Yet there are certain general features of construction and evolutionary ideas that take into account safety and economy. It makes little difference how a headgear is constructed if it satisfactorily fills local needs, and it is necessary to pay less attention to symmetry or appearance than to strain. The main compression members need to be placed in the line of the resultant of the strains on the rope, with due regard to the power and direction of the force applied.

THE world owes a debt to pure science that is not always recognized. The supreme test of anything in the commercial world is, "Will it pay?" and, with that result as the criterion, science certainly does "pay." Advance in all practical work is uniformly based on established scientific data. The lack of such accurate data often determines the difference between success and failure. Recently, in southern California, a firm contracting for the construction of a breakwater at San Pedro lost money, and ultimately had to give up the contract for lack of a little scientific knowledge of the rock in that locality. Because of acting in ignorance or defiance of scientific rules, the builders of a dam at Austin, Texas, occasioned the loss of a million dollars. When scornful question is made as to the use of all this science, it may well be asked what in mining, metallurgy or engineering could to-day be successfully done by the old rule of thumb.

FROM the Dewey mine, at Stuart, near Lewiston, Idaho, is reported ore as a "gold sulphide." All the metals without exception combine with sulphur in more than one proportion; what is true of the metals in relation to sulphur is equally true as regards chlorine, bromine and iodine. Sulphides, chlorides and bromides of the different metals are not uncommon. It has been considered, however, by some metallurgists that, though gold is sometimes found in the sulphides of the metals, doubt arises as to its having been present in chemical combination with the other constituents of the ores, the inference being that its presence is more mechanical than chemical. While the free gold found in many places has manifestly resulted from the oxidization of iron pyrites, the process of separation seems rather to have been due to the unclothing of the particles of imbedded gold.

TO THE scattered mine employes of the Transvaal telegrams from mine owners have been flying since the recent British advance, calling them from all parts of the earth to renewed duty at Johannesburg, where it is expected will be active resumption of work. The good salaries proffered induce acceptance. H. C. Behr, who left California last week, is credited with a proffer of $15,000 per annum and expenses. Allen Kinkead, foreman of the Best & Belcher and Gould & Curry, of Virginia City, Nevada, is locally credited with receipt of a cablegram requesting him to report at the earliest date possible at Johannesburg, at a salary of $6000 per annum. It is the publication of such announcements as these that so stimulate attendance at the mining schools, and make ambitious young men desirous of taking up the study of mining.

"AMERICAN INVESTMENTS," published at Buffalo, N. Y., claims to have figured it all out, and declares that "80% of the estates in this country either partially or wholly sink out of view because of waste, defalcations and wildcat speculations of trustees," and that "60% of all the life insurance money that comes to beneficiaries is wasted and fails to accomplish the purposes for which it was originally intended." If these statements are correct, it is in order for some statistician to show by comparison how much safer mining investments are, and how greatly larger a percentage of the money invested in mining results in satisfactory profit than in the risk and recklessness of the lines cited.

Concentrates.

TRINIDAD LAKE ASPHALT contains 4.33 parts sulphur; California, 7.51.

THE ordinary alloy used in casting in bronze is 90% copper, 8% tin, 2% zinc.

THE barometric reading on the summit of Mt. Everest—29,000 feet—is 9¼ inches.

FREIGHT on shoes and dies from San Francisco to Colorado points is $1.55 per 100 pounds.

IT will take twenty-nine pounds water at 180° F. to condense one pound of steam at 213° F.

A PRIMARY COLOR is a hue which is incapable of being produced by the mixture of any other two hues.

NITRATE OF GOLD is a doubtful quantity; at best an unstable compound immediately reducible to oxide of gold or metallic gold.

THE manager of the Canadian Copper Co., Cleveland, Ohio, can furnish the desired information as to electrolytic refining of nickel.

THE subject of the treatment of slimes was treated technically at length in the issues of July 22, 1899, July 1, 1899, and October 15, 1898.

ONE HUNDRED AND TWENTY-ONE stakes can be driven into a space 15 feet square, no two stakes to be nearer together than 18 inches.

A TON of Atlantic ocean water evaporated yields 81 lbs. salt; a ton of Pacific water, 79 lbs.; a ton of water from the Great Salt Lake, Utah, 175 lbs.

DILUTE SULPHURIC ACID, or aqua regia—one part nitric and three parts hydrochloric acid—will etch on steel. The steel surface should be clean and free from grease.

TO LIGHT fifteen 16-candle power incandescent lamps would require twenty-eight cells of seven plates, each 7¾x7¾ inches. These will discharge eight hours at the rate of 15 amperes.

THERE is a scale of hardness, but no "unit" of hardness. The scale would run downward as follows: Diamond, sapphire, topaz, quartz, orthoclase, apatite, fluorspar, calcite, gypsum, talc.

NOTIFICATION is received that the Congress of Miners at Paris, France, will be in session the 19th–23rd inst., instead of the 23rd–27th prox., as originally announced by the Exposition authorities.

IN California kaolin is found in various parts, notably in San Diego county. It is used by makers of pottery in Ohio and New Jersey, and is worth from $5 to $15 per ton, according to quality and condition.

THE "standard candle" is a candle made of spermaceti, and burning 120 grains of spermaceti per hour; it serves as the standard of gaslight, the gas burning from a jet at the rate of 5 cubic feet per hour.

TO DRILL a hole in a piece of hardened steel, use a new drill; sharpen it; then heat it to a low red and plunge it into a solution of zinc chloride; if the drill requires sharpening, always reharden after sharpening.

FINE nickel is produced electrolytically at Newark, N. J., in plates ⅝-inch thick; the Canadian Copper Co. have also erected a large experimental electrolytic plant at Cleveland, O., for the treatment of Bessemer nickel matte.

TO FIND THE AREA of a section of a ditch with sloping sides, add together the width at top and bottom in inches; multiply the sum by the depth in inches; divide the product by 2; the quotient divided by 144 is the area in square feet.

MOLYBDENUM will color a blowpipe flame a yellowish green. Its compounds before the blowpipe on charcoal yield a coating which is yellowish while hot and white when cold. The white coating takes on an azure tint when touched with an intermittent reducing flame.

WITH two boilers 48x24 inches, with twelve 6-inch flues each, if a single feed-pump be required, one having a steam cylinder 4½ inches, water cylinder 2¾ inches, and a 6-inch stroke, would do. For a duplex pump the steam cylinder should be 4½ inches, the water cylinder 2¾ inches, and the stroke 4 inches.

AT Butte, Montana, and in the Cœur d'Alenes, Idaho, miners' hours are ten; wages $3.50 per day. The Butte Miners' Union has made a demand on the mining companies of the district for a reduction in the hours of labor from ten to eight, which has been conceded by Clark and Heinze, beginning with the 15th inst.

AMONG the advantages of liquid fuel are that it can be run into bunkers or tanks by gravity, thus dispensing with tedious and costly loading by hand; it can be automatically brought to and into the furnaces, with similar economy in labor; it produces no ashes. A ton of oil contains twice as much heating power as a ton of coal.

IT would be possible to use pure aluminum for many of the parts of a 1 H. P. gasoline engine. An alloy of 90 parts aluminum, 9 parts silver, 1 part copper—by weight—would make a hard, serviceable, light metal, suitable for cylinder, piston and valves. The cylinder could be covered with a thin sheet-metal water jacket, and make a light and handsome engine.

A WELL-CONSTRUCTED asphalt pavement should last fifteen years. There is a piece of pavement on Front street, San Francisco, under the old MINING AND SCIENTIFIC PRESS office, upon which has been heavy and constant traffic for twelve years, and it is yet in excellent condition. Rectangular granite blocks laid on a formation of hydraulic cement concrete make the most durable street pavement, but the noise wears out the nervous dwellers, and, where human life is counted, the noiseless asphalt is much cheaper.

TELEGRAPH WIRES always run over a tunnel, instead of through it, because if they passed through they would require special wall brackets or overhead supports, involving considerable cost; the vibration of passing trains would tend to loosen the wire fastenings; the smoke, steam, carbon, acids and water deposits would tend to deteriorate the service.

AN electric motor may be reversed by putting a pole-changing switch in the armature circuit. If both circuits are reversed, the direction of rotation is the same as before. If the brushes are of copper, bearing flat on the circumference of the commutator, they must be reversed; if they bear endwise directly toward the center of the axle, they will not need changing.

ANIMAL OIL has no place around a gas engine. The best mineral oil gives best results. If the exhaust valve sticks and does not close, the valve should be reground and the valve stem cleaned. Irregular pressure of gas makes irregular motion. A larger gas-bag may obviate this difficulty. A gas engine won't stand overloading any better than any other power device.

IRON is the only substance of which the core of an armature can be made, since it alone can allow the magnetic lines to flow through it with sufficient ease. The shaft may be made of aluminum, for there strength is the only consideration, though aluminum is not good material for wear. To temper steel for a magnet, heat the ends of the steel to a red heat, and plunge it endwise into cold water.

THE base of all hydraulic mortars is lime, or oxide of metal calcium. Quicklime contains 44 parts by weight of carbon dioxide and 56 parts oxide of calcium. In slaking, 18 parts by weight of water unite with 56 parts quicklime, making 74 parts calcic hydrate. The process of slaking is greatly facilitated by the heat that is generated. Hydraulic lime contains 10% to 25% alumina. It differs from quicklime in that it hardens in water. It is either argillaceous or siliceous.

THE Federal Government has nothing more to do with title to mining lands after it gives a U. S. patent. The title vests in the patentee, absolutely, to the extent of the property granted. When the patentee gets his deed from the Government the land it describes becomes his private property. That property then becomes subject to the same rules of State law as any other real property within any State. (This answers the question of "Mountaineer," Ogden, Utah.; "S. S. G.," Boise, Idaho; "D. R. T.," Deer Lodge, Mont., and "F. G. C.," Shasta, Cal.)

THE MacArthur process of white lead manufacture consists in boiling a solution of soda tartrate or potash, or a mixture of these—a solution of Rochelle salt—in which lead oxide is dissolved; the solution after filtration is treated with carbonic acid while the solution is still boiling. The best result is obtained by the use of a quantity of ammonia slightly in excess of the chemical equivalent of the lead dissolved. When ammonia is present the temperature of the liquid need not approach boiling point, satisfactory precipitation being obtained with a temperature of 180° F.

THE principal engineering value of electricity lies in its adaptation to the transmission of power from some locality where power is cheap to others where it is dear. A steel rope, by its bodily motion, can transmit with appreciable friction and depreciation some hundreds of killowatts to a distance of some thousands of feet. A bare quiescent copper rope, ½-inch in diameter, and supported on poles, can, by maintaining an effective potential of 10,000 volts by the motion of electric waves over its surface, transmit 2500 killowatts with an energy loss of ⅔% per mile, and with practically no depreciation, except that of the poles and supports.

WATER with an 8-foot fall flowing 30 cubic feet per minute would, theoretically, give $\frac{5}{11}$ H. P., practically, about 80% of that, or $\frac{4}{11}$ H. P. Knowing the pressure in pounds per square foot—styled P—and the volume displaced in cubic feet per minute—styled V—the theoretical horse power may always be found by the formula H. P.$=\frac{P \times V}{33000}$. In the case specified P=62.5×8=500 lbs. per square foot, so H$=\frac{500 \times 30}{33000}$, or $\frac{15000}{33000}$, or $\frac{5}{11}$ H. P. The actual horse power would depend upon the efficiency of the motor.

A GOOD automatic, non-condensing engine requires from 3 to 4 lbs. of coal per horse power per hour, according to the quality of the coal. An automatic condensing engine requires from 2¼ to 3½ lbs. per horse power per hour. A steam-jacketed compound condensing engine of the most improved construction may reduce the consumption of coal as low as 1¾ to 2 lbs. per horse power per hour. The average amount of feed water required for a good, economical engine is 30 lbs. per indicated horse power per hour; engines of high economy will use less than this amount, and those more wasteful will use more. A high piston speed, together with a high rotative speed, is desirable; great power may thus be obtained from moderate sized engines. A good condenser increases the economical efficiency of an engine from 25 to 40 per centum, and the amount of injection water required is about twenty-five times the quantity fed into the boilers.

THE most serious form of corrosion in boilers is that which attacks the plates along the water level, forming a continuous line of weakness. This is due to the acids in the feed water, and can only be remedied by improving the supply. External grooving is often due to leaky calking, and is often caused by the use of a split calking tool having broken the skin of the metal. Buckled sheets usually result from neglect in keeping the boiler clean. Soft deposits are permitted to accumulate over the fire and become hard, allowing the plates to become overheated and to be pushed down with the pressure. In iron boilers this has been attended by ruptures, while in steel boilers the buckled part grooves thinner at its lowest point until a small hole causes a leak.

TO PREPARE proof silver, take any fine silver as free from gold as possible, dissolve in nitric acid, dilute copiously with distilled water, allow to stand several days, that any trace of gold present may settle, decant this solution carefully and filter. Then precipitate the silver with muriatic acid, stirring rapidly as the precipitation is taking place, so that the silver chloride may be well broken up. Then wash with distilled water, after which place a piece of commercial aluminum in the silver chloride and add a small amount of muriatic acid, which soon becomes converted into metallic silver. The silver is then washed; then add muriatic acid and heat to dissolve any aluminum contained. After washing thoroughly to remove all acid and aluminum chloride, dry and melt the silver, which will be 1000 fine.

IN the case of a running stream of water 6 feet deep, 8 feet wide and a surface velocity of 5 feet per second, the horse power—theoretical—can be determined as follows: The surface velocity being 5 feet, the average velocity is ⅘ of that, or 4 feet per second; then the head—theoretical—is 4 squared multiplied by .0155, or .248 foot. Then, multiplying together the number of cubic feet of water per minute, the vertical height in feet, and the weight of 1 cubic foot of water, the horse power is the quotient of the product divided by 33,000, thus: $\frac{(6 \times 8 \times 4 \times 60 \text{ (seconds)}) \times .248 \times 62.5}{33{,}000} = 5.41$ H. P. This, it must be understood, is the theoretical horse power. Upon the kind of motor depends how much of it can be utilized.

THE subway waters near the sea flow into it and are influenced by the rise and fall of the tide, in the same manner that sluggish rivers rise and fall with the tide, although their waters may constantly flow seaward. The rise in the tide increases the underground resistance to the constant flow of water toward the ocean. The waters of artesian wells near the sea have their natural outlet at various distances from the shore, according to the depth and formation of the water-bearing strata. Variations of pressure by tidal action over the outlets of such subterraneous waterways will react upon artesian well flow for a considerable distance from the ocean. Ordinary surface wells near the ocean are influenced by the same causes, and are found to vary their water level with the rise and fall of the tides.

NO FIXED rule can be given for mill practice, supply of quicksilver, etc., as such things are largely determined by the character of the ore. As to the grade from the battery of the copper or silver plates leading to the concentrator, it may be: For the full width plates, 1¾-inch fall to the foot; 16-inch width plates, 1$\frac{5}{8}$-inch fall to the foot; 4-inch sluice boxes, ¾-inch fall to the foot; single row of machines, 7 feet, total fall from mortar lip; double row of machines, 9 feet, total fall from mortar lip; the floor on which concentrators stand to be 7 feet below lip of mortar for single row of machines; but, if crowded for fall, the concentration box can be sunk or lowered 18 inches. If, however, the two usual rows of concentrators be used, the floor to be 9 feet below lip of mortar, to bring sluices above attendant's head when standing between the two rows.

STEEL BARRELS are made in London, Eng. The difficulty of giving the steel sheet the ordinary barrel shape is overcome by easing the curved rolls at the ends, so that they bear only in the middle, thus stretching the metal at the center and forming the barrel body complete, with the exception of shearing the ends straight in a special machine and welding the seam. The welding is done by electrically melting pieces of steel over the opening and hammering them down; the heads are cut in a circular shearing machine, corrugated and dished in a 400-ton hydraulic press, and secured in place by a ring of metal which is welded both to the end of the barrel and the head; the bung bosses are also welded on—no skilled labor being required for the process, and but moderate power is needed to supply the current.

FROM a water wheel of 500 H. P. capacity running a dynamo, the dynamo to operate motor 3 miles away, about 375 H. P. can be secured if modern machines are used and line properly constructed. Using the three-phase system for transmission, with a loss of 5% in the line, one would require three wires each number 0 0 0 0 B. & S. Particular conditions may slightly change the size of a wire. Generate the current at a potential of 1000 volts two-phase, step-up to 3000 volts by means of transformers and transmit by three-phase to save copper. If energy is to be used for both light and power, it can be transformed at the receiving end to 120 volts two-phase. This gives the advantage of the three-phase for transmission and that of the two-phase for generating and distribution; alternating.

The Evolution of the 300-Stamp Mill on Douglas Island, Alaska.*

Written for the MINING AND SCIENTIFIC PRESS by HENRY WATSON.

In this far-away corner of God's earth we read in technical journals of the great strides made in the industrial and mechanical centers of the busy world, of the building of huge steamships, giant locomotives, immense steel rolling mills and vast plants for the generating of electric light and power. Still, in one important branch of the mining industry we are in the van—as in the aggregation of 300 stamps under one roof, for the saving of gold by the amalgamating process, we lead the world.

Besides the big 300-stamp mill, there are four more stamp mills, all of them massed a mile along the easterly shore of Douglas Island, belonging to three corporations, all five under one general manager, built just above tidewater, crushing quartz from the mass of ore mainly of feldspathic nature, slightly impregnated with gold, which lies near, dips under the bay and runs parallel with the shore. The ore will average less than $3 per ton; yet it is worked from each claim at a profit.

Of the several factors which enter into the successful extraction and milling of such low-grade ore, nature has supplied three, viz: location, tide water and excessive rainfall; man has supplied capital, engineering and mechanical skill. The steady and gradual development of the latter factor on the milling question on the island is immense, as there are now 880 stamps on the lode. The first mill built on the Treadwell was five stamps. This was superseded by one of 120 stamps; another 120 stamps was added to it, and last year the 300-stamp mill was finished; so that at the present time the Treadwell has 540 stamps dropping on ore. The experience of the company with 240 stamps under one roof was of great value to them when deciding to build another large mill, that would give the greatest crushing capacity with the least increase of labor to run it.

To show the economy in labor in the simplest form, a table with the number of stamps and employes in the different mills on the lode is given:

Mill.	Stamps.	Employes.
1	100	11
1	120	11
1	120	11
1	240	22
1	300	23

The 100-stamp mill has the same number of employes as either of the 120-stamp mills; the 240-stamp mill, under one roof, has the same number of employes as the two 120-stamp mills, whereas the 300-stamp mill has only one more employe than the 240-stamp mill.

The crew in the 300-stamp mill is as follows: One foreman, four amalgamators, eight feeders, two oilers, one concentrator repairer, four concentrator men, two sulphuret pullers, one man handling kicker; total, twenty-three men. The crew is divided into two shifts, the requisite number for the day being thirteen and for the night ten.

The engraving of the 300-stamp mill shows two buildings, side by side, but 10 feet apart. The upper one is the battery room; the floor space is 72x300 feet; the batteries stand in two tiers and have a solid foundation on bedrock of cement and iron. The block of iron weighs seven tons; four anchor rods, 2 inches in diameter, secured in the bedrock, pass up through the cement, iron and battery mortars; the bolts are tightened from time to time, till the whole mass works solid. A layer of rubber ½-inch thick is placed between the iron and battery mortars to lessen the jar on the cement. The mill is driven by water power, about 700 inches being used. With a fall of 560 feet a pressure of 225 pounds to the square inch is secured. There is a main shaft for each tier of batteries. A Pelton wheel, 17 feet in diameter, is attached to each shaft, driving them direct, and the power is transmitted by two pulleys and belting to the cam shafts. There is a cam shaft for every battery of five stamps.

The mine hoists, with rock breakers on top floor, are distant from the mill about 1800 feet. A locomotive with six cars attached, of a capacity of two tons each, hauls the ore. The cars enter the upper building just under the comb of the roof; they are furnished with a false bottom, and, by a turn of a crank, are emptied into the ore bin, which has a capacity of 3000 tons. Sixty self-feeders supply the batteries with ore. A stamp weighs 1080 pounds and drops 101 times a minute with a fall of 7 to 9 inches; the stamps drop in the battery in the rotation of 1, 5, 2, 4, 3. An amalgamator is in charge of each tier of 150 stamps, with two feeders as assistants. The tiers are named respectively A and B, with each battery numbered from 1 to 30. A record of the time of all stoppages must be kept, with number of battery and cause.

The amount of water supplied to the batteries is very liberal and is regulated a good deal by the concentrating machines, which are liable to be flooded if the pulp from the batteries gets over a certain amount and causes a loss of concentrates. Screens of 30 and 35 mesh are used and a copper plate is placed inside each battery. The apron plate is 4 feet 6 inches by 10 feet, with a grade of 2 inches to the foot. The plates are coated with a solution of quicksilver and kept clean with a solution of cyanide, and the amalgamators aim to keep the plates hard. The amalgam is cleaned off the plates only once a month—always on the day shift—five batteries per day, so that it takes twelve days every month to clean up.

When cleaning up, the apron plate is steamed, and, while the amalgam is soft and plastic, the plates are scraped with sharp chisels; meanwhile the battery plate and pulp around the dies are put on a car and run into the cleaning room, which is situated in the center of the concentrating building, up under the roof. This arrangement brings the cleaning room floor just on a level with the battery floor. The machinery and furnishings of the cleaning room are up-to-date and labor-saving, consisting of revolving barrel, amalgamating pan and quicksilver squeezer. As the pulp leaves the apron plate 4-inch iron pipes carry it to the concentrating room, entering just under the eaves. Here, against the inner wall, quicksilver traps are placed for the pulp to run over; there are sixty of them—one for each battery. As the pulp reaches the concentrating machine, it passes over the distributor, upon which an amalgamating plate. 18 inches by 6 feet, is placed. These plates are cleaned simultaneously with their respective batteries above.

Two concentrators, with belts 6 feet wide, handle the pulp from each battery. The vanners are driven by two water motors, 30 inches in diameter and placed just under the comb of the roof. This arrangement admits of two tanks being placed under the motors and saves the discharge; it is piped by gravity to all the machines. The vanners are in four tiers of thirty machines each. The building is 80x300 feet, allowing a floor space of 200 feet for each machine. It is in this room that the extra man in the 300-stamp crew is employed. He is hired to run the kicker. In the 240-stamp mill the vanner men handle the kicker, as the concentrating machines there are only 4 feet wide. The kicker is light and is attached temporarily to and driven by the motor of the vanner machine. The kicker used in the 300-stamp mill is a local invention; it is placed across the aisle, tapping two boxes at once; it is driven by compressed air, and is used to expel water enough from the sulphurets so they can be handled without waste. There are two aisles in the building, one of which is shown in the engraving. A man is employed in each to regulate its sixty machines and see that they do their work properly. Nothwithstanding the large number under each man's care, the machines look bright and clean. As the mill was originally planned the vanner room was to form two wings, with sixty machines on each side of the battery building; but the plan was changed to the present one to save further excavating into the hill. This change of plan makes it very pleasant in the concentrating room, separating it from the deafening roar of the batteries. A track is laid in each aisle, cars run in and are loaded with sulpherets; a locomotive is attached and pulls the cars up a trestle built over the wharf, when the sulphurets are dumped into the hold of a coal hulk and shipped as return cargo to the smelter at Tacoma.

The mill is crushing daily 1300 tons of ore, which yields almost 2% of concentrates, as the mill is now producing twenty-five tons per day. The assay of mill tailings on the island will surprise a great many California mill men, as it runs usually from 10 to 15 cents per ton, though a great many assays show only a trace. The low rate of loss is due, I have no doubt, to the uniform distribution of the sulphurets in the mass of ore. The mill is well lighted throughout, requiring 480 incandescent lights. The electricity is supplied by a dynamo situated in the compressor room at the mine hoist.

We will now compare the crushing capacity of the new mill with the company's old 240-stamp mill, taking it for granted that the old mill was up-to-date when built fifteen years ago.

A stamp of the new mill weighs 1080 pounds, falls 7 inches 101 times per minute. Reduced to 9544.5 foot tons.

A stamp in the 240-stamp mill weighs 850 pounds, drops 6 inches ninety-eight times a minute. Reduced to 4998 foot tons.

The crushing capacity of the new mill seems more comprehensive when we say that 32,724,000 pounds of metal drops 7 inches on the ore every minute, and that this great force is used to extract a metal invisible to the naked eye; that one minute's dropping of so many million pounds of iron produces one-seventh of an ounce of gold, and even then one-third of this value is in the concentrates, requiring roasting and smelting, besides a transportation of 800 miles to the smelter.

The crushing capacity of the new mill is 90% greater than the old one. The additional drop and rate of speed is accounted for in the style and shape of the cams, those of the new mill being longer and straighter. A great many mill men favor the old-style cam, with light stamp, claiming it requires a less percentage of power to drive it, and that this idea is adopted generally in California now in building new mills. The 240-stamp mill was built to be run by both steam and water—the new one by water only—and was shut down from the end of December to March 21st last winter.

In southeastern Alaska, where the rain is always on tap, so to speak, the country mountainous, suitable for ditching purposes and securing water power at high pressure, the new style of mill has come to stay.

The late Captain Thomas Mein was consulting engineer for the Treadwell Co. when the new mill was planned and was superintendent here before going to South Africa; he was, therefore, well acquainted with all the details of the milling question on Douglas Island, and the new mill stands as his last work of a long, busy life, whereby he secured a maximum of crushing capacity with a minimum of labor—a parallel of which will be hard to find. Angus McKay was superintendent of construction, and G. W. Hewitt is now foreman of the mill.

* See illustrations front page.

Issuance of U. S. Patent.

TO THE EDITOR:—In your issue of May 26th you state in "Concentrates" that application for patent does not relieve from assessment work.

This statement is of interest to us; we hold a receiver's receipt from the Land Office for a patent to a quartz claim, for one year and nine months, and the patent has not been issued yet. Do you think it is necessary to do assessment work on a claim after the money for the patent has been paid into the Land Office and the applicant holds a receipt for such patent?

What can we do to hurry the issuing of the patent?

Bourne, Or., June 1.

The "Concentrate" referred to was in answer to an Idaho subscriber who asked if mere application for a patent absolved him from any further necessity for annual assessment work. The Bourne, Or., matter is entirely different. In this case the inquirer states that he has filled all the requirements and gone clear through with all expected from him. The delay in issuance of the patent is merely a clerical one, and not chargeable in any way to dilatoriness or neglect on the part of the miner. He has done all that is required, and to all intents and purposes is presumably in possession of patented ground. The mere receipt of the patent itself is incidental. Nothing can be done to hasten its issuance. In the fullness of time it will be sent from Washington, D. C.

PREVIOUS to 1882 an average of 80% of all the copper produced in the United States came from the mines bordering Lake Superior. In the following year—1883—the Lake Superior region produced 51.6%, Arizona 27% and Butte, Mont., 21.4% of the domestic copper. The percentage of the Butte output continued to increase steadily, and in 1887 it became greater than the yield from the Lake Superior mines. This lead has ever since been advanced until in 1898, when 60% of all the world's copper was supplied by the United States, Butte furnishing 41%, Lake Superior 30% and Arizona 21% of all the domestic production. Thus Butte practically furnishes a quarter of the copper product of the world, nearly one-half of which is the output of a single company—the Anaconda.



Pinal Consolidated Mine Tram and House, Near Florence, Arizona. (See page 675.)

T. K. ROSE has conducted a series of experiments on the electrolytic recovery of gold from cyanide solutions in which mercury and amalgamated copper plates were used for receiving and retaining the deposited gold. It was found that the electric current had to be of very low density, about 0.01 ampere per square foot of receiving service, to obtain complete amalgamation of the gold removed from the solution, since stronger currents threw down a portion of it in the form of a black powder, which would neither amalgamate nor wash off the surface of the mercury without brushing or wiping. The proportion of black powder increased rapidly with denser currents until most of it was deposited in this form. Consequently for the adequate recovery of the gold by electricity and amalgamation a low density of current was essential, and this necessitated a large cathode or receiving service. Owing to the high cost of mercury and also to the outlay in providing large copper plate services, the author arrives at the conclusion that the lead cathode at present in use is not likely to be superseded by a mercurial or amalgamating one. Furthermore, it was found that the amalgamated copper plate cathode was attacked, in spite of the electric current, by the cyanide solution, to the detriment and waste of the latter. This would further militate against the practical use of these plates.

THE hardened end of a steel bit or chisel broke off in a bore-hole 165 fathoms deep, put down near Ostroppa by the Upper Silesia Deep Boring Co., Zoellner & Co., and this obstruction effectually prevented further boring of the hole, because all diamond crowns wore away. After the most varied attempts had failed to remove the piece of steel, the following plan, says the Colliery Guardian, was hit upon by Engineer Degenhardt of Gleiwitz. A soft steel bar, 5 feet in length and 2.7 inches diameter, was covered by a single winding of india-rubber tape and magnetized by the current of a small dynamo driven by the portable engine employed for the work of boring, and the current was kept constant at about 30 amperes by means of a simple resistance coil. The steel bar was let down into the hole magnetized, and when it reached the bottom the current was switched through the conductor enclosed in the rope for letting down and drawing up. On the first day that this method was employed the piece of steel was drawn up to the surface, so that boring could be resumed.

A CHICAGO stock brokerage firm has leased a private telegraph wire from Chicago to San Francisco. They already have a private wire from New York to Chicago, so that they now control for their own exclusive use a wire service of 3000 miles from ocean to ocean. The 1000-mile section of wire from New York to Chicago costs $18,000 annually.



Gallows-Frame Over the Wolfe Tone Shaft of the A. M. & W. Co., Leadville, Colo.
(See page 676.)



Two-Post Frame, Potosi Mine, Near Coulterville, Cal.



Head Frame Oneida Mine, Amador County, Cal.



Head Frame Cripple Creek, Colo.



Steel Head Frame, High Ore Mine, Butte, Montana.

Typical Mine Head Gear—(Discussed on Page 666).

The Use of Aluminum Line Wire and Some Constants for Transmission Lines.*

NUMBER II.—CONCLUDED.

By F. A. C. PERRINE and F. G. BAUM.

The wire used was intended to be equal to No. 3 B & S copper wire in its electrical resistance, and the manufacturers were required to furnish this conductivity in a wire not weighing more than 420 pounds per mile. All the wire supplied was carefully inspected by A. E. Kennelly, and his reports give the following averages for the total quantity:

Diameter	293.9 mils
Weight per mile	419.4 pounds
Resistance per mil foot	17.6 ohms at 25° C.
Resistance per mile at 25° C	1.00773 ohms
Conductivity compared with copper	59.9% by dimension
Tensile strength of wire	1549 pounds
No. of twists in 6 inches for fracture	17.9
Tensile strength per square inch	32898

Comparing this with copper, it is seen that this wire is approximately the same as copper in the following sizes:

Size of aluminum wire = No. 1 B & S copper
Resistance of aluminum wire = No. 3 B & S copper
Tensile strength of aluminum wire = No. 5 B & S copper
Weight of aluminum wire = No. 6 B & S copper

Therefore, on the basis of the same conductivity, the aluminum compares with copper as follows:

Diameter for the same conductivity	1.27 times copper
Area for the same conductivity	1.64 times copper
Tensile strength for same conductivity	.629 time copper
Weight for same conductivity	.501 time copper

The mechanical properties of this wire present some well marked characteristics. In the first place, the number of twists necessary for fracture varies considerably, although the ductility test of wrapping six times around its own diameter, unwrapping and wrapping again is well sustained. This irregularity in the twisting test is generally a mark of impurity in wire, but we know so little as yet of the exact characteristics of aluminum in particular, and the twisting test is in general so unreliable that it is unsafe to base any exact statement on this one test, particularly as the same after erection proved reliable. In carefully performing the test for tensile strength no exact point could be assigned for the elastic limit, as the metal seemed to take a permanent set almost from the first, but, at a stress of from 14,500 pounds to 17,000 pounds per square inch, there is a marked increase in the permanent set which indicates that the safe working load lies somewhere in this region. In this the characteristics of the aluminum do not differ materially from those of copper or other similar metals, and while this is a disadvantage it is not a singularity.

The fact that the wire will permanently elongate if seriously strained makes it necessary to use the utmost care in the erection of lines, and also the known high coefficient of expansion with temperature changes taken in conjunction with this property renders care in line stringing especially important and difficult.

Instructions to line foreman in stringing wires:

1. All spans are to be strung with deflections and tensions as specified.

2. Up and down hill spans to be sprung to correspond with level spans. In case level spans cannot be used, then employ dynamometer, and ease all wires over cross-arms.

3. All ties are to be made at one time by signal.

4. All ties are to be made crossing wires around insulator serving three times around wire, and twisting behind insulators; the ends of the tie-wires are not to be cut but bent back toward insulators.

5. All the wires on the outside of the insulators, except at corners where all are to be tied so that the strain is against the insulator.

6. Joints are to be made by means of sleeves twisted two and a half times, the ends of the wires being given one turn by hand around the wire; no tools being used, except in twisting the sleeves, and cutting of the ends of the wires. Before inserting the wire in the sleeve, the ends of the wire must be roughened by draw-filing.

7. Barb wire is to be laid along the roof of the pole and held by three staples driven in tightly, but without kinking the wire. Ground wires are to be soldered to the barb wire, and at the bottom of the pole to the wire leading from the ground plate. All soldering acids must be carefully washed away after the soldering is done.

8. Beginning between poles one and two, all wires are to be barreled by shifting one pin, and same to be repeated between poles 21 and 22, and 41 and 42, and so on. Barreling always in the same direction of twist every twenty poles. A record must be kept of the location of every wire and every pole.

GENERAL CAUTION.—The greatest care must at all times be taken against kinking or scarring the wire; wherever the wire is accidentally kinked or scarred it must be cut and spliced.

The targets consisted of light sheet iron strips about 2 feet long and 2 inches wide, with aluminum hoop bent into an eye at the top, by means of which they could be hung from the line wire. These targets were painted in three or four colors, with bands 1 inch wide. In use the captain of the linemen would hang his target on the wire to which a man on the next pole had also hung a target; then, as the wire was being pulled into place, he would sight from a band on his target to the same band on the adjacent target, and when the wire came into line with these two bands the signal would be given for all the linemen to tie at once. As a result of this method of stringing, an exceedingly uniform line, and one strong in accordance with the temperature was obtained.

One of most serious problems in connection with the use of aluminum is in the choice of a proper joint. This metal is so highly electro-positive that it is unsafe to expose it to the elements in contact with any other material, as electrolytic corrosion is almost sure to follow such construction. Many of the failures which have been reported of this metal have been due to a neglect of this fact, as notably in cases of the plates on the yacht Defender, where the plates have been corroded at the contact with the bronze rivets used in fastening them to the frame. Whenever this metal is soldered or used in contact with any other metal, the joint should be thoroughly waterproof to prevent such action. After discussing many joints, it was finally determined to abandon any attempt to solder or clamp the wire in any manner, and the joints were made by slipping the ends of the wire into an oval aluminum tube about 9 inches long, which was then twisted with a pair of clamps similar to those employed in twisting the McIntire connector. After twisting the tube a turn was taken by hand of the loose ends, and the wire cut off close. The joint produced proved practically equal to the original wire in both tensile strength and electrical conductivity.

This wire was erected during the winter 1898-99, which was an unusually open winter over the whole State of California, allowing practically continuous construction work, though the temperature varied all the way from about 30° F. to 80° F. at times when the wire was being strung. After it was finally erected it remained about three months on the poles before the machinery was delivered and put in place. During the first month of that time three breaks occurred which were all apparently due to flaws in the material, but after these breaks were repaired the line wire gave absolutely no trouble whatever, various accidents occurred to other parts of the construction. Many insulators were shot at and broken, bale wire and bale rope were thrown over the line, a twig short-circuited one phase and fell down burned, a large bird was killed by contact with the wires, and finally several porcelain insulators with porcelain pins were broken off and hung suspended by the wire. In January and February of the present year this whole line was taken down to give place to a much heavier one of the same material, an opportunity for an entire change having been found after the total destruction of the power house by fire last November.

During the past two years other lines of aluminum wire have been erected on the Pacfic coast, all but one of which have given a considerable amount of trouble from causes that are not entirely apparent.

One line in Nevada county, erected at about the same time as that we have been describing, and for which the wire was of practically the same lot, has given no trouble whatever.

The power transmission lines of aluminum wire about Seattle have broken a few times but have not given serious trouble. The breaks in this line, so far as the writers have been informed, seem to have been due to not allowing enough sag at the higher temperatures, and a consequent overstraining of the wire to cold weather.

The most serious difficulties have been encountered by the telephone company in Washington and Oregon, and by the Yuba Power Company. In all of these cases it seemed almost impossible to keep the wires on the poles in certain sections, and in these portions the lines have been finally taken down and replaced by other wire of either copper or aluminum. The writers have examined many breaks from these lines, and would judge, from the appearance of the fracture, that the cause, whatever it may be, was similar. In those breaks there are many small flaws, but by far the greatest majority are clear, sharp fractures, with but a slight reduction of area, and that entirely on one side, a break very characteristic of improperly mixed and brittle alloys. Partially from the appearance of the fracture, and partially from the facts the breaks occur only in certain sections of the line, the writers are of the opinion that this trouble is due to the presence of impurities in the material. This view is strengthened by the fact when measurements were made on the line of Yuba Power Company, the resistance of the whole line was found to be 10% greater than it should have been if it were made of the quality of material described in the earlier part of this paper.

As general conclusion, it is the opinion of the writers that aluminum can be safely used in place of copper where the proper precautions are taken in inspecting the wire before it is erected, and in erecting it with due consideration of its perculiar properties of low and indefinite elastic limit, high coefficient of temperature expansion and active electrolytic power.

Indicating our faith in this opinion, it may be noted that for the new line soon to be erected an aluminum strand ⅜ inch in diameter has been ordered. This strand will be spliced with aluminum sleeves.

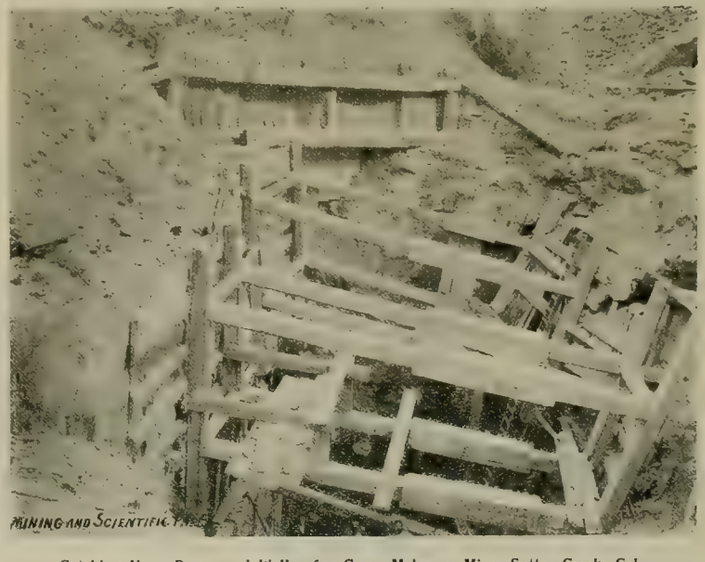
* Abstract of paper read at the seventeenth general meeting of the American Institute of Electrical Engineers, Philadelphia, May 16, 1900.

Mining on the California Gold Belt.

NUMBER IV.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS, Assistant State Examiner of Mines.

The accompanying engraving, from a photo taken specially, illustrates more clearly than words the manner of catching up a dump and the crumbling walls of a cave in the open cut of the Mahoney mine of the Wildman Co. at Sutter Creek, Cal. Many years ago the former operators excavated large stopes between the 200 level and the surface of this mine, and a great quantity of ore was also taken from open cuts. Last January the ground standing between the roof of one of these old stopes and the open cut suddenly caved. No one was injured, as the ground was recognized as being particularly bad and no men were employed there. The cave was at first about 4 feet square, but in a few hours had enlarged to four times this area. A large dump at the end of the cut threatened to slump into the hole, which was hourly growing larger. It was determined to make an effort to catch the dump and also, if possible, to stop the further caving of the ground. Mgr. John Ross and his foreman, Stephen Thomas, devised a plan which was executed with dispatch. Twelve to twenty men were employed for several days, and the ground was all secured and hundreds of tons of good ore was recovered and sent to mill. The first work consisted in placing the two heavy spliced timbers and three posts seen in the background. The horizontal members of this set were about 30 feet long and 18x20 inches thick, with splices 20x12 inches, 16 feet long, bolted at the center. These were placed fearlessly while the ground was actually caving under the feet of the workmen, but desperate situations demand desperate measures. The main members were placed in position and secured by old mine cables to "dead men" located in solid ground some distance away. The spiling was driven behind the set and the dump was secured from running down into the mine. The remaining members of the sets were then placed in position piece by piece, the hole being constantly enlarged by caving and being broken down, the cave proceeding toward the standpoint from which the picture was taken. The ore passed down into the old stopes below, with much waste, which, under the circumstances, was unavoidable, of course, and this was drawn off through chutes, sorted and sent to mill. The entire operation was ingeniously handled and assisted by lack of rain, which at that particular time would have probably caused a disastrous run of the surface ground.



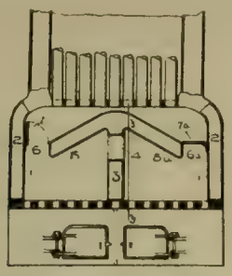
Catching Up a Dump and Walls of a Cave, Mahoney Mine, Sutter Creek, Cal.

Mining and Metallurgical Patents.

Patents Issued June 5, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

FURNACE.—No. 650,821; C. M. Bump, Bay City, Mich.



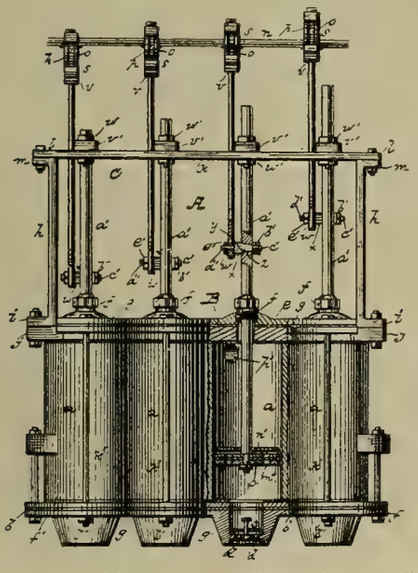
In a water-heating furnace combination with grate of vertical water-containing partition dividing grate surface into two parts; gas passage through partition; water-containing top for partition extending laterally over fire; dampers for regulating gas exit between laterally extending top and furnace wall.

PICK.—No. 650,882; W. F. Walker, Charlestown, W. Va.



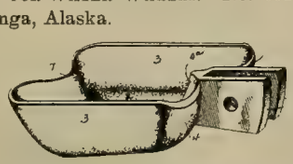
In a miner's pick, combination with handle, of clip having socket in which handle is engaged, oppositely extending shoulders at sides of clip having threaded perforations, set screws engaged with perforations, parallel lugs extending longitudinally from outer end of clip and separated by interspace, lugs having alining perforations formed therein, head between lugs and having perforation registering with perforations of lugs, and pin engaging alining perforations, pin having lesser diameter than perforations and head lying in path of outward movement of set screws, whereby head may be moved outwardly to engage and move pin outwardly and cramp it against outer walls of perforations of lugs to prevent its displacement and to hold head upon handle.

PUMP.—No. 650,896; J. M. Green, Mill Creek, Utah.



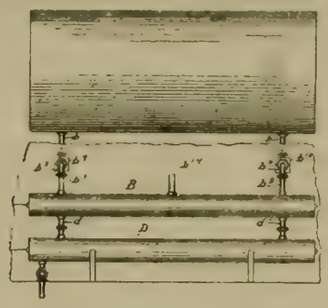
Pump, comprising series of cylinders, having offset and formed of single piece, lower plate provided with perforated cups and valves c, plates b, B, top plate e, pistons, having perforations and formed of two parts, having packing, and valve n′; reservoir mounted upon offset communicating with cylinders by channels p′, and valves t′, arranged above channels and within reservoir; piston rods, having openings z, wedge-shaped blocks or arms y, pitmen and frame, composed of end standards, side bars and cross-bars v′, and eccentrics, mounted on shaft n.

BUCKET FOR WATER-WHEELS.—No. 651,101; F. R. Brown, Unga, Alaska.



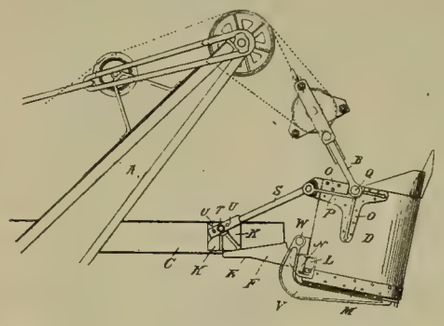
A bucket for water-wheels, comprising cup-shaped casting having perfectly flat bottom and outwardly flaring divergent sides, inner and outer ends of bucket each having two outwardly flaring curved or bulging portions separated by inwardly projecting rib curved in cross section and gradually merging at its lower end into flat bottom of bucket.

ATTACHMENT FOR PREVENTING BOILER INCRUSTATION.—No. 650,916; W. A. Sheets, Lexington, Ky.



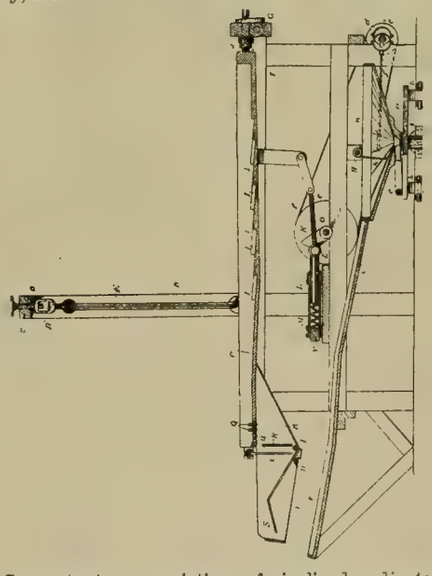
Attachment for preventing boiler incrustation, combination of cylinders located one above the other on outside of furnace wall communicating with each other by pipes at their opposite ends, pipes at opposite ends of upper of cylinders passing through furnace wall and communicating with boiler or boilers at under side whereby water is caused to circulate through cylinders, sediment collected therein and purified water returned to boilers, and blow-out pipe connected to lower of cylinders for discharging sediment from them.

DIPPER ATTACHMENT FOR DREDGERS.—No. 650,991; A. W. Robinson, Milwaukee, Wis.



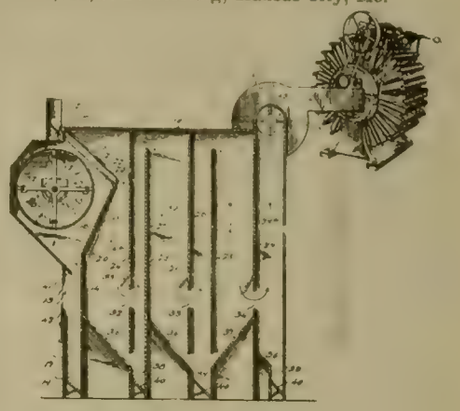
Combination, in dredger dipper, of arm or handle, plate having flanges which embrace end of handle, lugs on plate, plate extending across lower rear side of dipper overlapping bottom lap streak thereof and having lugs thereon which with those on arm plate form hinge, and means to confine upper edge of dipper in proper position.

CONCENTRATOR.—No. 651,006; S. T. Curtis, Virginia City, Nev.



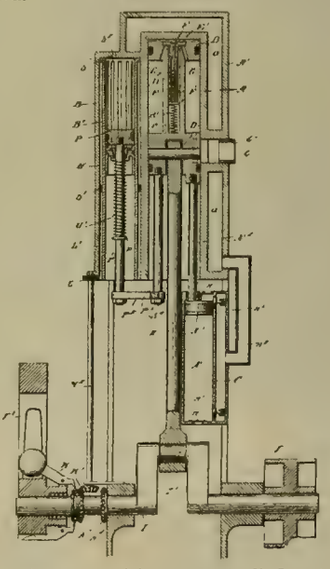
Concentrator consisting of inclined adjustably suspended and supported table, with bottom composed of steps or offsets, and mechanism by which table is given longitudinal and concussive movement, subdivided trough carried by lower end of the table, with means for discharging material reaching that point upon opposite sides of partition of trough, fixed arms projecting into trough whereby material therein is agitated and loosened, discharge pipe or pipes upon bottom of trough, overflow from outer edge of trough, screen into which overflow is received, with passages by which material arrested thereon is delivered from either side, fixed apron upon which material passing through screen is received, chute delivering material into vertically journaled pan, means by which pan is oscillated about its shaft, supporting plate beneath pan and rollers upon which plate rests, central discharge pipe from pan, and stationary fingers projecting into pan to agitate contents.

APPARATUS FOR SEPARATING GOLD FROM SAND.—No. 651,022; J. P. Sterling, Kansas City, Mo.



Pneumatic apparatus for separating gold from sand, primary passage having pocket at lower end, air inlet port above pocket and outlet port in upper side, in combination with screen mechanism in upper portion of primary passage and series of alternating drop passages and uptake passages, one of former communicating with outlet port of primary passage, uptake passages having pockets at lower ends communicating therewith and with lower sides of drop passages, uptake passages communicating with drop passages at upper ends, further provided with intermediate ports above pockets communicating respectively with drop passages, baffles in drop passages above ports and means for creating current of air through primary, drop, and uptake passages.

GAS ENGINE.—No. 651,216; F. W. Toedt, Bamburg, Iowa.



A gas engine, comprising power cylinder, two connected pistons therein forming an exhaust chamber between them, cylinder having exhaust ports uncovered by inner or power piston when in its outermost position, power piston having exhaust ports extending through it, valve plate carried by power piston and adapted to be held closed by pressure in cylinder, spring acting to hold valve open, stop engaging plate to close exhaust ports just before ignition, and means for introducing and igniting charges of gas within engine.

PROCESS OF MAKING METALLIC SULPHATES.—No. 650,980; O. Meurer, Cologne, Germany.

Process for manufacturing sulphates of metals, free from iron, from metallic sulphides containing sulphide of iron consisting in mixing ores when containing too high amounts of sulphide of iron with minerals free from sulphide of iron and sulphur, heating mixture with polysulphides of alkalies, cooling mass and causing it to crumble after addition of water, drying mass and subjecting crumbled dried mass to spontaneous oxidation at air, while heating to 400° Fahrenheit and lixiviating afterward oxidized mass with water, whereupon obtained solutions of sulphates are separated from undissolved remains.

ANTIFRICTION ALLOY.—No. 650,911; W. N. Rumely, La Porte, Ind.

Antifriction alloy formed of lead about seventy-two parts, antimony twelve parts, phosphorus .0175 part and tin about 15.9825 parts.

Outlines of Structural Geology.

Written for the MINING AND SCIENTIFIC PRESS by J. A. EDMAN.

The science of geology of the present day in teaching us the structure of the earth and the mode of upbuilding of its crust gathers its evidence from the accumulated observations and experiences of centuries, and from all parts of the globe, and the general laws it presents apply, therefore, not to one country alone but to all. In briefly tracing the geological history of the Sierra Nevada we, therefore, review the general sequence in the upbuilding of continents, while inquiring into the special conditions that have contributed to give their distinctive characters to the gold-bearing rocks of the Sierra.

The forces instrumental in forming the outer crust of the earth and in maintaining, modifying and altering the same are either igneous or aqueous, the one representing the action of heat, the other that of water and watery vapor. It is generally conceded that the primary rocks of the globe were of igneous origin, and that they contained practically all the elements from which subsequent rock formations have been derived.

Whatever these primary rocks were, from them and from subsequently erupted matter were derived all of the material of the various sedimentary formations now found on the earth, and from the first appearance of land at the surface the formation of new strata has been proceeding in ever widening cycles and under general and immutable laws.

In geological development the igneous forces seem to represent intensity, the aqueous quantity, and the latter, being the most widespread and predominant, will here be first considered. The phenomena of sedimentation deal not alone with inorganic matter, but organic life has everywhere been an active factor in the formation of sedimentary rocks, in their accumulation, consolidation and decay, and this as exemplified in the older geologic systems has a special bearing upon the genesis of the ore deposits of the Sierra Nevada.

Starting, then, from the primary crystalline rocks rising out of a primeval ocean, the air and water represent the ever active elements which in constantly increasing progression have formed new deposits from the ruins of pre-existing rocks. Such deposits may form upon the surface of the land, in the ocean, in enclosed seas, in bays, estuaries or inland lakes, the matter deposited being either in larger fragments, as rocks, pebbles and sand, suspended in the water as sediments, or dissolved in a body of water, either salt or fresh. Of the latter condition, the salt of the sea is the most prominent illustration, as it resulted from the gradual solution of the soda minerals of the rocks. The solid matter thus derived from the erosion and degradation of pre-existing rocks gave rise to the first sedimentary deposits, and these being again acted upon by the aqueous forces originated later deposits of fragmentary material, the rocks of the Carboniferous and later eras chiefly represented in the Sierra Nevada being made up from the fragments of Archæan, Cambrian, Silurian and Devonian formations, of which, however, only a part have been clearly defined on this coast. They must of necessity represent all the substances contained in these rocks not dissolved out of them by the great upbuilding and disintegrating element of the world, water and watery vapor.

It is conceded that the original or Archæan rocks contained all the chemical elements we know of as original constituents of the earth's crust, inclusive of the metallic elements, and as a consequence the gold, silver, copper, lead, iron, manganese, etc., which we now find in mineral deposits must have been present in the former seas of all periods. It is, however, to be noted that whereas the erosion of the primary period affected only the original rocks, that of later eras also acted upon the older sedimentary formations, which in their turn furnished material for new deposits.

During all these ages the waters of the globe, besides their eroding and transporting capacity, also dissolved certain and often large percentages of the elements of the rocks with which they came in contact, and chemistry has taught us that nearly all of these elements are now found in solution in the waters of rivers and lakes, but chiefly in the ocean. The most abundant are lime, magnesia, alumina, potash, soda and silica, combined with carbonic acid, chlorine and sulphuric acid, and, of the metals, iron, manganese, lead and copper, and in less quantity silver and gold. In the waters of lakes and rivers many of these elements are found in stronger solutions.

It is evident that if the solvent power of the water has been constantly exerted a time would certainly come when the waters of the sea would become saturated with mineral matter, and consequently unable to support life, and nature, therefore, wisely provided for processes of precipitation and separation, by which means the elimination has kept pace with the solution, and the precipitated matter has been added to the sands and sediments, and has formed an integral part of all our formations.

The elimination processes were partly chemical, such as the crystallization of salt and the formation of sulphides by the reducing action of organic matter in suspension in the water, and partly organic, such as the secretion of lime by the myriads of coral and shell-forming organisms and the separation of silica by diatoms and other infusoriæ, by which two processes alone vast beds thousands of feet in depth and hundreds of miles in extent have been formed.

The latter processes of deposition from solution, being contemporaneous with the deposit of sediments in suspension, have in the course of ages furnished us with the sedimentary formations of the globe, and these must of necessity contain all the materials and elements of the rocks preceding each formation, in most instances pretty evenly distributed through the various beds.

To bring about concentration, nature, however, provided a plan to enrich even the sediments, which was chiefly by constant oscillations of the surface of the land, by which deep seas and bays became shallow and finally land-locked, and a concentration of solutions and consequently more active chemical and organic precipitation became possible over limited areas, which is exemplified by the growth of coral reefs and the formation of salt beds. In most instances these special deposits again subsided beneath the sea and were covered by new strata.

Had nature rested then, we should have had nearly horizontal sedimentary strata, with an occasional concentration of special minerals at or near the junction of two beds, as was the original condition of various deposits in California.

But an allwise Providence had ordained that still greater concentration of useful minerals should take place before the earth should be occupied by the last and most advanced of the animal creation, to enable man to fulfill his destiny on earth, to which end the igneous forces of the globe were called into co-operation with the aqueous already referred to. Evidences of these forces are found even among the oldest sedimentary beds in the vast sheets of effusive rocks poured forth originally as lavas from active volcanoes, or the often equally large masses intruded between strata from subterranean outlets, and these flows of volcanic rocks were supplemented by great accumulations of fragmental matter from subaerial volcanic vents, as bombs, lapilli and ashes, as well as mud flows, all of which are often found superimposed upon distinctly sedimentary rocks and forming a special feature among the metamorphic rocks of the Sierra Nevada. It is to be noted that many of these igneous deposits mark periods of oscillation of the surface and a change from a deep sea to a shallower, from a shallow sea to dry land. It should also be remembered that great changes in the physical character of the sea occurred during the inflow or deposit of volcanic material, in the temperature and chemical constituents of the sea water and its capacity for solution and deposition.

(TO BE CONTINUED).

Tellurium and Its Compounds.

Tellurides are compounds of the metal tellurium, with other metals. The varieties include many ores valueless to the gold miner, such as the tellurides of mercury, lead, bismuth and nickel. Men sometimes speak of tellurium when they intend to refer not to that element itself, but to its compounds with gold and silver. Tellurium is a metal; it occurs native, in a free state, as gold and silver do. It is tin-white in color, soft, but brittle, and usually occurs in a granular massive condition. Its commercial value is $4.00 per ounce, but the demand for it in the arts is very slight, and a few shipments quickly demoralize the market, as is the case with most of the rare metals. In Boulder county, Colo., native tellurium often occurs in gold ores, and a mass of twenty-five pounds was once found in the John Jay mine, near Jimtown.

All the tellurides have a rich metallic luster, most of them are steel-gray to iron-black in color, and they are all heavy, ranging in specific gravity from 7 to 9. If a mineral is suspected of belonging to this class remove a small bit of it with the point of a knife and put it in a porcelain dish or white saucer. Then add a couple of drops of strong sulphuric acid and heat it over a lamp. Should tellurium enter into the composition of the suspected mineral you will quickly see a beautiful purple suffuse the colorless acid. The miner's time-honored test is to put the specimen in the fire of a blacksmith's forge, where it is roasted. Tellurium fuses at a low temperature, and becomes volatilized, passing off in white fumes of telluric oxide. If there be gold present it remains in globules. If more precious telluride be hidden in cracks within the specimen the gold will be exuded in a yellowish perspiration. The experienced miner has learned that all telluride ore is not rich from the disappointing returns of many a shipment to the smelter, and while he does not know whether the delusive mineral be native tellurium or a compound of one of the baser metals, he does know that gold may be absent and that a rough test, such as roasting, is of assistance. Some miners are apt to call everything native tellurium that does not stand this test, but it should be pointed out that the experiment would fail to distinguish the telluride of mercury, because mercury volatilizes easily and passes off in fume. The telluride of mercury is called Coloradoite, because it was first found in that State, in the Mountain Lion mine at Magnolia. A simple test is to roast a particle in a glass tube, when the mercury liberated at the hot end will pass off in fumes which will condense into metallic globules at the upper or cooler end of the tube.

Coloradoite is grayish-black, and has a rich luster. The most valuable ore of tellurium is Calaverite, the tellurium of gold. It is named after the county of Calaveras, in California, and was first determined by Professor Genth from specimens furnished by the Stanislaus mine. Cripple Creek, Colorado, ores contain Calaverite, and it occurs in those of Boulder county, especially in the Horsfall mine, at Gold hill. The typical mineral contains 44.5% gold and 55.5% tellurium, but the ordinary varieties carry about 3% of silver, replacing some of the gold. The purest varieties have a bronze-yellow color. Calaverite is difficult to distinguish from iron pyrites, as the difference in color is slight, the streak of the former is yellow-gray and of the latter brownish-black. The easiest mode of distinguishing between them is by their hardness, Calaverite being two and one-half (or easily cut with a knife), while iron pyrites is slightly over five (or cut with difficulty by a knife). The cubic crystalline habit of pyrites will help to make it known, for Calaverite rarely occurs in any but a massive form.

Calaverite is the telluride of gold; hessite is the telluride of silver. Hessite resembles argentite, sulphide of silver, often called "silver glance" by miners. The former contains 62.8% of silver and 37.2% tellurium; the latter is composed of 87.1% silver and 12.9% sulphur. Both are sectile—that is, can be cut by a knife, like wax, and both are steel-gray to iron-black in color, the silver sulphide being decidedly darker than the corresponding telluride. Fine specimens of hessite have been found in Boulder county. At the Golden Fleece, in Hinsdale county, Colo., hessite occurs associated with petzite, and in the Shoofly mine, in the La Plata mountains, Colorado, it accompanies sylvanite.

Hessite is frequently impure—that is, gold enters into its composition, so that it finally gradates into petzite, which contains 41.86% silver and 25.60% gold, combined with 32.54% tellurium. Petzite, although darker, is also steel-gray to iron-black in color, but it is far more brittle than hessite. The Village Belle mine, at Eldora, Colorado, yields a massive variety, and the Golden Fleece ore contains petzite and hessite so intimately associated as to make it difficult to distinguish them. Petzite, like all the tellurides, has a rich luster suggestive of a mineral containing the precious metals, and though it is usually common wherever tellurides occur, it is not common in the Cripple Creek district.

Sylvanite is another double telluride of gold and silver, containing a little more gold than petzite and less silver, its composition being 28.5% gold, 15.7% silver and 55.8% tellurium. The two minerals are, however, easily distinguished, sylvanite being steel-gray to silver-white, and a brilliant, beautiful mineral having a characteristic crystalline structure, to which it owes its name of graphic tellurium, the arrangement of the crystals resembling Arabic lettering. It is much softer than petzite. Fine specimens of it occur plentifully at Cripple Creek, Colorado, especially in the Independence, Portland, Moon-Anchor and other properties. It is also a characteristic ore of Boulder, especially in the Salina district. Sylvanite loses its silvery sheen when it undergoes decomposition, the tellurium becomes oxidized and the gold which finally remains often retains the crystalline form of the original mineral—that is, it is pseudomorphic, after sylvanite. Specimens of gold having this structure are frequent in the Cripple Creek ores.

The above are the chief ores of tellurium containing the precious metals. The telluride of lead, called altaite, often carries gold and silver as an impurity. It is a tin-white mineral and soft. Nagyagite is a variety containing 9% gold and 54% lead. Silver and copper also usually enter into its composition. This mineral is very soft; it is black to lead-gray in color, and has a foliated structure which renders it peculiar among tellurides. Both these last-mentioned minerals occur in Boulder county, Colo., especially in the Jimtown district.

The telluride of bismuth, tetradymite, and that of nickel, melonite, are very rare. The accompanying list may prove useful for purposes of reference:

Calaverite, tellurium, 56%; gold, 44%; hardness, 2½; color, bronze-yellow.

Hessite, tellurium, 37%; silver, 63%; hardness, 2½ to 3; color, steel-gray.

Coloradoite, tellurium, 38%; mercury, 62%; hardness, 3; color, iron-black.

Tetradymite, tellurium, 48%; bismuth, 52%; hardness, 1½ to 2; color, pale steel-gray.

Melonite, tellurium, 76%; nickel, 24%; hardness, 3; color, reddish-white.

Sylvanite, tellurium, 56%; gold, 28%; silver, 16%; hardness, 1½ to 2; color, silver-white.

Petzite, tellurium, 33%; gold, 25%; silver, 42%; hardness, 2½ to 3; color, iron-gray.

Altaite, tellurium, 38%; lead, 62%; hardness, 3; color, tin-white.

Nagyagite, tellurium, 32%; lead, 54%; gold, 9%; hardness, 1 to 1½; color, lead-gray.

A mineral scratched by a finger nail has a hardness of about 2; one which is cut by a knife is about 5½ in the scale of hardness. The composition of all these minerals varies according to the locality, producing varieties which the mineralogists recognize, often under special names which complicate the study of the subject.

A Contract System.

There are two ways, says the Rossland, B. C., Miner, in which contract work is usually undertaken in a mine: the one is the method of paying for each foot of advance and the other per ton extracted. The first is open to the objection that untrained men will not break away as much rock at each lift as men who are better skilled. Sometimes an excessive quantity of dynamite is used, and sometimes the holes are not broken out to their full extent. The loss partly falls upon the miner, as he gets paid only by results, but also upon the mine owner, who loses much important time in getting his work forward. The loss falling on the men will too often occasion them to form the opinion that the remuneration received for the work done is not commensurate with the exertion applied. Moreover, the waste of dynamite is frequently considerable. Again, this kind of contract, though readily applicable to straight driving or sinking, can not easily be used in stoping. For in this latter case the excavation, instead of being regular, follows the shape of the deposit, which, lying often in curves, convexities and concavities, has a breadth extremely variable. Hence it can not readily be calculated.

On the other hand, the method of payment per ton extracted is open to the same objections, and has another superadded. This is the cumbersome nature of the necessary details and the expense entailing thereunto in order to keep each man's output separate from that of his fellow worker. There is also another objection, which is equally applicable to either of these systems, and that is that both are insufficiently elastic. For should it be requisite in the economical working of the mine to set an extra number of drills going at any one particular part of the backs, faces or headings for a short period, fresh contracts have to be laboriously entered upon with a consequent loss of time, which is itself the very essence of the reason of the temporary change desired.

At the War Eagle Supt. Davis has hit upon a third method, which, while retaining all the advantages of contract work, takes upon itself the mobility of day labor. Instead of paying contractors per ton or per foot excavated, they are being paid per foot drilled. A contract is made with each separate machine. Two shifts, each of eight hours, are employed instead of three. One round of holes each of so many feet depth, usually five, is drilled during these two shifts. Nor is the whereabouts and direction of the holes so drilled left to the individual will of the men with the machine. On the contrary, the foreman, a thoroughly competent miner, marks before the beginning of the work the place and the direction of the hole that has to be drilled. Two men at the expiration of the work go round to every heading and charge the face prepared.

It will at once be seen that this being done during the third, or late night shift, prevents time being wasted. The air also is sweet and wholesome by the time the contractors are again ready to proceed. Natural ventilation where existent alone will clear the atmosphere of the generated gases. Thus there is less call upon the blowers or suckers to create an artificial draught so as to render the air fit to breathe within a short period. Even with these artificial appliances, under the old system the air was seldom purified under thirty to forty-five minutes. Here again a saving is effected. In the quantity of dynamite used restriction is necessarily employed, for where it would be hard to detect waste among 400 or 500 employes, it is easy to detect the culprit where only two or three responsible persons are employed for this portion of the work. Further, the system has the great advantage of mobility; the machines can be moved from one part of the mine to another. The only account necessary to be kept is the miners' place of working from day to day, and the rate per foot which is obtaining at the various headings, or backs, at which they are employed.

So much for the theory. Supt. Davis informs a representative of the Miner that it has worked so far exceedingly well in practice. Taking some hypothetical figures, and remembering that 70 feet of drifting was supposed to be a good month's work in such mines as the War Eagle or Iron Mask, the following results are obtained: Seventy feet used to cost the labor of three shifts of two men upon each. In other words, the work of six men for one month represented 70 feet. It is now found that four men under the new system will accomplish 100 to 125 feet. To effect this latter amount under the old system fifty to sixty days would be required at an average payment per man of $3.50. Now this same work is done by four men, who obtain a considerable higher wage. A saving of 40% is thus effected. More than this there is less misdirection of energy, less waste of skill, time and material, which together will bring the economical working of the mine under the present system in vogue to an even smaller percentage on the older method.

Nor must it be considered that this saving is made from out of the vital reserves of the miner. He is only working eight hours a day, and he can do, and maintains that he is able to do, as much in those eight hours as in ten with less fatigue. Fewer men are employed at any one heading, but this is fully made up by the greater amount of back undercut on which other machines can be employed. Further, as this method reduces the cost of mining, bodies of low-grade ore formerly untouchable, as they would not pay the expense of working, are now brought into the mining practicabilities, and men will soon be stoping out deposits that formerly had to be left alone.

Thus, from either point of view, from that of the worker or from that of the operator, system is a great success. It employs more men at a higher wage, and yet does more economical work.

New Mexico Artesian Well.

Herewith is an engraving from a special photograph of an artesian well drilled in the Pecos valley, New Mexico, with a big Keystone driller. A local account says:

"The flowing stream came boiling out of the 5½-inch casing and stands 24 inches above the top of the casing. The flow is estimated at from 1400 to 1800 gallons per minute. The rule heretofore has been to allow 100 gallons for every inch the flow stood above the casing of that size, but the Register has calculated the flow at 75 gallons per inch per minute, which is believed to be accurate. When confined in an additional joint of casing it stood 12 feet 4 inches above the ground.

"The manner in which Elza White and his crew of workmen have done this work calls attention to the fact that they have attained most satisfactory results with the Keystone driller. They work day and night, having two shifts, and usually finish a well in four, five or six days. The machine is powerful and is equipped with heavy drills that go through anything."



R. S. Hamilton Well, Roswell, New Mexico; drilled with the Keystone Machine 349 Feet in Ten Days by Elza White.

The water in these wells is found in a layer of sand and gravel from 200 to 600 feet below the surface. As soon as the pipe is driven into this stratum the water rises. A number of wells have been put in, and, with only a few exceptions, they all flow. This water is believed to come from the melting snow on the mountains and percolates through the porous gravel until it finds a vent. The gravel is overlaid with a blanket of blue clay and putty-like alluvium. What is being done along the Pecos and Hondo rivers can be done in many other parts of New Mexico and western Texas, as well as other parts.

In making these wells, it is essential that the piping be carefully put in in such a way that the flow of water will be conducted to the surface. Unless this is done, the water may rise a certain distance and flow away through open crevices or dry strata of sand without appearing at the surface at all. These wells now being made in eastern New Mexico are being used not only for watering stock, but for irrigation, and form one of the cheapest known methods for getting water for this purpose. The amount of water to be obtained seems to be limited only to the number of holes put down, and wells have been put down within a few hundred feet of each other without seeming to lessen the amount of water discharged.

THE 700th anniversary of the first mining operations in Germany will be duly celebrated this month in the Hartz mountains, where silver and copper have been steadily mined since 1200. The Emperor will grace the occasion with his presence. The event is of note as illustrating the permanence of the metal mining industry. The celebration will be at Hettstedt in Saxony, where the first mine is said to have been opened.

Partial Programme of the International Mining Congress at Paris.

The following is a partial programme of the International Congress of Mining and Metallurgy, which meets in Paris in connection with the Exposition, June 18 to 23, as furnished by the General Secretary of the Congress, M. Griener, 55 Rue de Chateaudun, Paris, France:

MINING.

1. "Use of Explosives in Mines," by M. Delaford, Inspector-General of Mines, France; M. Denoel, mining engineer, Belgium; M. V. Watteyne, director of mines for the Ministry of Industry of Belgium; M. H. Le Chatelier, professor at the College of France.

2. Use of Electricity in Mines.—Reports by M. Wendeling, chief engineer for Siemens & Halske, Berlin; and M. J. Lebert, chief engineer of the mines of Namur, in Belgium.

3. Conditions of Mine Working at Great Depths.—Reports by M. Hrabak of Germany; M. Stassard, of Mons, Belgium; M. Poussigne, director of the coal mines of Rosschamp. Also M. Petit, chief engineer of the Compagnie des Houllieres de St. Etienne, France, a paper on the working of the thirteenth level at the Villiers shaft.

4. Means for Reducing the Manual Labor Required in Mines.—"Substitution of Machines for Hand Labor in the Mines of the United States," by M. Bachellerie; "Tests of Machine Drills in France," by M. Paul Fayol, director of the mines of Brassac; "Mine Drills in the United States," by M. Chodzko, mining engineer, San Francisco, Cal.

5. Mechanical Preparation of Coal for Market.—Report by M. Buisson, director of the mines of Commentry, France.

6. Studies on the Development of the Mineral Industry and on Statistical Questions.—"The Mineral Production of the United States, and the Production of Gold in the World," by R. P. Rothwell; "The Iron Ores of South Russia," by M. Syzmanowski; "Uniformity in Mineral and Metallurgical Statistics," by M. de Dittmar, chief of the Statistical Bureau of the Miners' Association of south Russia.

METALLURGY.

1. Progress in the Metallurgy of Iron and Steel Since 1889.—"The Present Condition of the Manufacture of Thomas (basic) Steel, and its Effect on Wrought Iron Manufacture," by M. Rocour, manager of the Forges et Acienes du Nord et del Pest, France; "The Manufacture of Special Steels," by M. Babu, professor at the School of Mines, St. Etienne, France; "Phenomena Accompanying the Deformation of Metals," by M. Hartmann, Puteaux, France; "Direct Utilization of Blast Furnace Gases," by M. Hubert, Liege, Belgium; "Present Condition of the Manufacture of Steel," by M. Tissot, chief engineer of the Societe des Aciers Robert.

2. Applications of Electricity to Metallurgy.—"Aluminum at a Low Price," by M. Heroult, engineer of the Societe Electro-Metallurgique of Froges, France; "Magnetic Separation of Ores and Minerals," by Dr. H. Wedding of Berlin, Germany; "The Wetherill Process of Separation," by M. Sneits of Dusseldorf, Germany.

3. Progress in the Metallurgy of Gold.—"The Cyanidation of Gold-Bearing Ores in the Transvaal," by M. Bousquet.

MINING SUMMARY.

ARIZONA.

COCHISE COUNTY.

W. H. McKittrick and Ryan Bros. have bonded a group in Turquois, making a preliminary $10,000 payment. The mine is regarded as a copper property.

GILA COUNTY.

Globe Times: Supt. Calder of the Pinto Creek M. & M. Co. says that work on the tunnel on the Yo Tambien mine is being carried forward.

MOJAVE COUNTY.

Near Chloride, at the Elkhart mine, E. Hilty has been engaged as foreman; work will shortly be resumed. F. W. Theis is manager.

On the Schuylkill mine, south of the Elkhart, work begins upon the arrival of machinery.

The new steam plant at the Silver Age mine has been up and running for several days past, and both day and night shifts are at work in the mine. The ore body now being sunk upon is of good size and quality; and when the 200-foot point is reached, crosscuts north and south will be commenced and prosecuted a distance of 200 feet both ways, when the work of stoping will be inaugurated. This mine joins the Connor-Minnesota on the north and the Silver Knight and Johnny Bull mines on the south, and the fine and high-grade quality of the ore now coming out has caused arrangements to be made to open up and work the two latter.

The Mollie Gibson, owned by H. L. Frank of Butte, Mont., is still idle.

The turquoise mine of Braun & Coolidge, near the Colorado river, has been bonded to J. C. Stewart of Denver for $12,000.

Rich silver ore is reported in the Little Wallapai mountains, 20 miles southeast of Kingman, by T. Tyrell. C. Metcalf of Kingman is putting up money for development.

The Yucca Cyanide M. & M. Co. has decided to close down its work at the San Francisco mine for the present. The owners are said to have disagreed.

PIMA COUNTY.

Dr. Lennox tells the Tucson Star that the Helvetia mines are producing 110 tons of ore daily. The strike in the Isle Royal on the 180-foot level continues to grow. The crosscut shows the ore body 24 feet wide, averaging 15% copper.

J. A. Copeland at the Mammoth mine is in charge of the improvements, which include twenty additional stamps to the 50-stamp mill.

PINAL COUNTY.

(Special Correspondence).—The El Pinal Consolidated Silver and Lead mine in this county is 18 miles from Florence. It has been idle for several years. It has recently been purchased by W. H. Norway of Santa Barbara, Cal., together with the Lena and Martinez, the latter carrying copper. The new owner will resume operations. The property is 45 miles from the S. P. R. R. At Casa Grande a branch road is projected to the Bay mine. This will bring this property within 6 miles of the railroad. This is one of the mines that in recent years would not pay with the depreciation of silver, but with better facilities can be worked at a profit.

Florence, Ariz., June 5.

The main shaft on the Mammoth mine is being sunk to a depth of 1000 feet.

C. Meyers has sold his copper property, 25 miles from Casa Grande, to H. L. House of Denver.

CALIFORNIA.

AMADOR COUNTY.

The Sargent mine, south of Jackson, is to be developed.

At Volcano, Supt. Dickerman will sink the shaft of the Altaite mine 150 feet deeper.

The Central Eureka at Sutter Creek is to have a 20-stamp instead of a 10-stamp mill.

Supt. Joyce of the Defender mine, Volcano, is in San Francisco. He projects a new 10-stamp mill.

At the Bunker Hill mine, near Amador City, the water has been lowered 500 feet, and the shaft is retimbered.

Work in the tunnel at the Butte Mountain mine has stopped.

At the Newton copper mine, between Jackson and Ione, the smelter will begin July 15th.

In the Amador Queen No. 2 mine the shaft is 1235 feet. Crosscuts west will be run at the 800 and 1200 foot levels.

CALAVERAS COUNTY.

Near West Point the Lone Star Co. will sink the shaft to a depth of 500 feet below the bed of the Mokelumne river.

The Lockwood mine is unwatered, and sinking has begun.

In the French Hill tunnel at Mokelumne Hill, Burton & Co. have struck sulphuret ore 18 feet in width.

HUMBOLDT COUNTY.

Trinity river is falling and promises to go lower by September than it has done in many years. Then there is likely to be a good deal of bar mining until the winter rise comes.

KERN COUNTY.

Bakersfield reports that E. M. Roberts has sold 120 acres of land adjoining the Kern river oil district for $48,000.

Bakersfield Californian: The California Standard has all its tanks full; 1450 barrels on hand. The oil is between 20 and 21 gravity; a car is filled in thirty-one minutes.——The Hercules Oil & Producing Co. of Los Angeles is reported to stand ready to put in a $30,000 refinery here if a suitable site is donated. The products to be turned out, if the enterprise is established, are asphaltum, paints, lubricants and gas engine distillates.

MARIPOSA COUNTY.

The Barcroft mine at Hornitos is reported sold for $13,000.

C. S. Baxter, who piloted a party of mining men from New York in a special car with their Supt., T. P. Bisland, interested in the Nameless mine, 5 miles from Coulterville, says that the company will spend half a million dollars in development work. "The Merced river will be dammed, an electric plant put in and the company will erect a 40-stamp mill."

Mariposan: The Mariposa C. & M. Co., at the Mariposa, has the vein at the 275-foot level and a ledge 2½ feet thick is being followed.——At the Princeton the shaft is down 630 feet. At 750 feet a station will be cut. The 10-stamp mill will be running next month.——At the Josephine the shaft is down 275 feet below the tunnel. A station will be cut at 300 feet and drifts run. ——The shaft at the Pine Tree is below the tunnel 350 feet. A station will be cut and drifts run at 400 feet.

MONO COUNTY.

Bridgeport Chronicle-Union: S. G. Lines of Antelope Valley is at Benton, and has arranged to open the copper property, consisting of forty claims, near Benton.

NEVADA COUNTY.

Union: Supt. Dulmaine has fifteen men employed at the Golden Treasure, developing the property.

ORANGE COUNTY.

At Santa Ana it is estimated that $300,000 has been invested within the county this year in oil development. A small stratum of oil is reported struck in the first well of the Orange County Oil Co., indicating that the oil formation continues south.

PLACER COUNTY.

The Michigan Bluff M. Co.'s tunnel is in 660 feet; about 150 feet more reaches the channel next month. The main tunnel cut through an old upraise with figures showing that work had been abandoned on it in 1860.

At a recent Boston meeting of stockholders of the Pioneer G. M. Co., the management voted on 53,000 shares; the opposition voted on 12,000 shares—a total of 65,000 out of the whole capital of 100,000 shares.

The majority vote authorized the directors to incur an indebtedness for the development of the property; to mortgage the property to secure the indebtedness; to dispose of the property at public or private sale, and to form a new company and to exchange the shares of the old company for shares in the new company upon a basis to be decided upon by the directors.

Colfax Sentinel: In the Hidden Treasure mine at Centerville, the main tunnel is in 8500 feet. The company have been breasting the channel to the width of 600 feet. They will extend No. 5 gangway, crosscutting the channel 1100 feet; thence north up the channel 1000 feet, in order to work a portion of the upper lead where the main tunnel is too high to work it. A room has been cut in the cement 20x30x12 feet, on the right of the main tunnel at a point 5000 feet in. Here an electric hoist and pump is used to develop the blue channel 32 feet lower. A drift of 350 feet has been run on the channel, and crosscuts are being made which have developed 150 feet width of channel. Supt. Akers reports 175 men on the payroll. Twenty trains drawn by an electric motor bring out 350 cars daily. The Hidden Treasure drift mine is operated upon the most extensive scale of any drift mine in the State. The mine is paying regular dividends and never looked better.——Work will be resumed at the Pioneer quartz mine, near Towle.——R. Jones, Supt. Canada Hill mine, is working twenty men. A tunnel 900 feet in length has struck gravel.——D. Lovelace, in Humbug canyon, below Red Point, will erect a 5-stamp mill.——The Bald Mountain gravel mine is being worked through a shaft. Number of men employed, 15; W. H. Bell, Supt.——Over $200,000 has been spent on the Big Channel, Rough & Ready and Peckham Hill gravel mines in an effort to discover the outlet of the deep channel on the lower Forest Hill divide. The tunnels were all too high. It is believed that the tunnel now started in Snyder canyon at an elevation of 2100 feet will be low enough to tap the channel.

PLUMAS COUNTY.

Work on the Little Onion Valley quartz mine has been resumed under the management of Plumas Turner.

Mining operations are to be resumed at the Red Slide and in a gravel mine at the head of Poormans creek.

SAN BERNARDINO COUNTY.

(Special Correspondence.)—The Bagdad mine, 7 miles south of here, is preparing for development. Buildings are being constructed and a 25 H. P. gasoline engine is in place. The assay value of the pay ore body in shaft and levels is said to be considerable. Porphyry constitutes the country rock in the vicinity. C. Grant is resident superintendent.

Ludlow, June 12.

SAN DIEGO COUNTY.

The reduction works at National City were burned last Sunday evening. Recently S. H. Lucas established a cyanide plant at the works and operated it with power from the engine room. With this exception, the plant had been idle for several years.

D. C. Collier Jr., at Julian, is trying to effect a consolidation of the Kentuck S. and Cincinnati Belle mines. They are adjoining properties; a tunnel driven into the Kentuck S. unwatered both mines and it would be economical to work the two together. The tunnel is 938 feet long. The Kentuck S. shaft will have to be sunk 190 feet to meet the tunnel, and the Belle shaft 225 feet.

SHASTA COUNTY.

(Special Correspondence.)—It is reported that ochre ore assaying $700 per ton has been met with in a raise in the Summit mine, 7 miles north of here. The extent is not known so far, but good-sized kidneys of similar ore have been extracted from the same mine. The country rock is tough diabase. The Marina Marsicano M. Co. are the owners.

Ono, June 13.

The Spread Eagle copper claims are bonded at $125,000 by C. D. Galvin to the Scottish-American Development Co.—a payment of $62,500 to be made before July 1, 1901, the remaining $62,500 on or before July 1, 1902, and the further consideration of 20% of the capital stock of the company.

SIERRA COUNTY.

P. M. Keefe has a bond on the Saddle Buttes mine, above Sierra City.

In the Alaska mine, Pike City, Supt. Dunlap will tap the old shaft with a tunnel. The 20-stamp mill will start crushing ore.

SISKIYOU COUNTY.

The dredger at Hawkinsville, Yreka creek, has started up. It is claimed that it will move 3000 cubic yards of gravel every twenty-four hours.

The O. & C. mine, about 4 miles from Hornbrook, bonded and leased by C. W. Tyrer & Son, is in ore 30 inches wide, showing free gold.

The new town of Carman has been located near the Dewey mine; a smelter is projected. The ore runs $15 per ton. The company is shipping to the smelter at Keswick; working fifty men.

TEHAMA COUNTY.

The directors of the Tehama County Oil Co. have let a contract to sink a well 1200 feet.

TRINITY COUNTY.

(Special Correspondence).—Owing to the destruction of the Lewiston bridge and the deep fords of the Trinity river, the rotary gravel mill, to be operated here by G. E. Bailey, will not be ready to run till about June 25th.

Lewiston, June 9.

A large pumping engine is to be put in by the Altoona Q. M. Co.

The Trinity G. P. M. Co. has incorporated; W. Maitland, D. J. Noyes, G. W. Baker, H. L. Baker, F. Nettlefold, F. G. Steuart, M. W. C. Wemyss; capital stock, $50,000.

TUOLUMNE COUNTY.

Supt. Roberts this week starts work on the Little Wonder, near Carters. Supt. Graham has begun work on the McKinley mine, in the same locality. The Slap Jack, near Groveland, will resume about July 1. J. Hamilton of Sonora has taken charge of the Hazel Dell mine. Near Groveland, A. Zeets, at the Rhode Island, is putting up a 52-foot gallows-frame; an 85 H. P. boiler will be put in.

Near Jamestown the Harvard mine has its new 60-stamp mill in operation. The ore is hoisted at No. 2 shaft, run to a rock-breaker over a 600-foot tramway; the crushers are operated by a 75 H. P. electric motor; the stamps weigh 1100 pounds each. Six plates 3x6 feet and two splash plates 6x36 inches are used to each battery, all of copper, plated with two ounces silver per square foot. Power for the mill is supplied by two independent 75 H. P. motors, set in line with the back of the batteries, and at each end of the mill; a smaller 30 H. P. motor operates the concentrators. The electric power, from the Tuolumne County Water Co.'s plant above Phœnix lake, is delivered at 15,000 volts, three-phase, to two transformers, which in turn deliver the current at 440 volts, two-phase, at 8000 alternations per minute.

COLORADO.

BOULDER COUNTY.

Near Gold Hill the Prussian mine shaft has been sunk through a 200-foot cap of spar. When the cap was broken through an ore streak 3 feet wide was found, going from ten to twenty ounces gold.

The Cash mine is being unwatered.

The Slide mine is shipping. The mine is worked altogether by leasers, twenty-five or thirty men finding employment.

CLEAR CREEK COUNTY.

The new mill at the Stanley mine is to have 100 tons daily capacity.

W. E. Renshaw at Idaho Springs is leasing and bonding the Mattie mine.

FREMONT COUNTY.

The new $500,000 chlorination mill of the U. G. Ex. Co. at Florence will be in operation Sept. 15th. Present capacity 400 tons, maximum capacity 600 tons.

HINSDALE COUNTY.

Manager Farrell of the Lellie mine, near Lake City, will erect a mill and install machinery, the mill to have a capacity of sixty tons daily.

At the Czar mine, at Capital City, T. Tonge has three tunnels started.

LAKE COUNTY.

(Special Correspondence.)—The Home M. Co. will soon have its new hoist ready for operating, when the Penrose shaft will be sunk 100 feet deeper. It is not believed that the proposition to consolidate the Home Co. with the New Leadville Co. will be acceptable. The properties of the latter company are up California gulch, near the Yak tunnel, and comprise five claims, making about sixty acres.

The Adams, Maid & Wolfe Tone lease, in charge of S. D. Nicholson, will soon be in position to produce a large tonnage through the Wolfe Tone shaft. The underground workings of the three named are all connected and a connection with the Mab can be made with little difficulty. The latter is opened through a shaft about 1800 feet southeast of the Wolfe Tone shaft and is also under Mr. Nicholson's management. The new gallows-frame over the Wolfe Tone shaft is constructed of redwood and stands 82 feet above the ground and 60 feet above the ore landing. The main timbers are 16x16 inches and are put up without any mortising, being held together by heavy iron bolts. The shaft is three compartment and well timbered. Within the last thirty days the water in the shaft has been lowered 200 feet by a triple expansion pump set at the 750-foot station. This pump handles 1000 gallons per minute, has 20-inch high pressure, 30-inch intermediate and 44-inch low pressure cylinders, with 36-inch stroke. Later on, when the shaft has been sunk to the 1300-foot level, a second pump will be set at that station. A first-motion hoist, having 20x42-inch drums, has been ordered and will soon be in place. At present an old-style hoist answers the purpose. Seven boilers of 100 H. P. each supply steam for the necessary power.

In sinking on this group of mines from the surface to the 1300-foot level four distinct contacts have been pierced. The first was a carbonate ledge at about 660 feet depth; the second, at about 720 feet depth, was composed of a lead-zinc sulphide; the third, at 970 feet, was an iron sulphide; the fourth, at 1200 to 1300 feet, is a clean iron sulphide with some copper. By this it will be readily seen the Maid of Erin, Wolfe Tone and Adams have been producers of ores having a diversity of grade and character. The leasing company now in control, and which has put a large sum of money into new equipment, expect to reap their reward, in the main, from the great sulphide stratum, comprising the fourth contact.

The Silver Cord M. & L. Co., under the management of W. L. Cooper, are shipping fifty tons per day from the Silver Cord mine on Iron hill. Within thirty days the tonnage is expected to reach 150 tons per day. The present tonnage comes from the 400-foot level. The shaft cuts through two contacts, the first being an oxidized silver, lead and iron ore, the second a silver, lead and zinc sulphide ledge. A 247-foot upraise is being made from the Yak tunnel to the Silver Cord grounds at a point 600 feet south of the Silver Cord incline.

The Yak tunnel has advanced about 9000 feet from its entrance in California gulch to a point under the summit of Breece hill. About seventy tons of ore

per day are shipped through this tunnel.

The Morning Star Con. group, comprising some sixteen shafts on Carbonate hill, maintains a shipment of about 100 tons per day of manganese ore and iron fluxes, all produced by lessees under the general directions of the company.

The Arthur lease on the Catalpa is shipping about twenty-five tons per day of iron oxides from the 500-foot shaft.

The Yankee Doodle mine, on Carbonate, is being operated by the Leadville M. Co., lessees, who are making small shipments. They are running a new level at 400 feet depth. The ores carry iron, silver and manganese.

The Modoc, on Carbonate, is reported as shipping fifty tons per day of manganese ore.

The Ruby mine, on Iron hill, operated by the Ruby Leasing Co., or Maxwell, Horrigan & Goodwill, have shipped a considerable tonnage from the carbonate contact, at about 500 feet depth, comprising lead carbonates, sulphides and some horn silver. They are now sinking 80 feet lower to cut the second contact, wherein they expect to find the same rich body of lead sulphides as was found in the Louisville, several hundred feet to the north.

The Louisville is reported to be preparing to install a hoist at the head of the incline, 645 feet below the surface, to enable them to operate a skip to handle a quantity of iron ore on the lower levels.

The Mike & Star, on the southwestern slope of Breece, is operated by the Buena-vista Smelting Co., who are shipping therefrom about forty tons per day of iron sulphide ores.

The Stevens shaft of the Iron-Silver M. Co., on the south side of California gulch, has been unwatered and a new 100 H. P. boiler and air compressor are being put in. The old hoist is in good condition and will be used. The shaft, now 560 feet deep, will be sunk deeper and other development prosecuted.

Of the 2700 tons of ore per day sent to the smelters from Leadville district only about 300 tons belong strictly to the class of lead carbonates, which originally made the camp famous.

The Resurrection is the heaviest producer of lead oxides, while the Ibex is the principal producer of siliceous and sulphide ores. The Leadville gold ores come mainly from the Breece and Little Ellen hill section. The iron and zinc-lead sulphides comprise the larger proportion of the camp's tonnage.

The Nil Desperandum, on Rock hill, has opened a ledge of manganese ore, with some silver values.

The Nisi Prius, on same hill, is doing a good deal of work and shipping a small tonnage of lead and iron oxides. They are sinking a new shaft.

On the south part of Rock hill are the Revenue shafts, and farther to the northwest, near the Union smelter, is the Valentine, being developed by Maj. Bohn and associates. Their work is of a prospecting nature, to determine as to the continuity of the carbonate ore shoots of the downtown mines southwesterly through Rock hill.

About 150 tons per day of siliceous, sulphide ore are being shipped from Sugar Loaf mountain, which lies just west of town, beyond the Arkansas valley. The shipping mines there are the Gunnison, Red Hook, Dinero, President, Black Iron and Tiger.

The Ballard, on Breece, is shipping thirty tons per day from the 450-foot level. The ores are a dry siliceous material, running well in gold.

The Ibex is shipping about 200 tons per day, all of which is being hoisted from shafts Nos. 2, 3 and 4, which are 700, 900 and 1100 feet deep, respectively. From fifteen to eighteen air drills are being operated. The upper levels of the Ibex produce an iron oxide, carrying gold, much of which is free, and good values in silver and some copper. These oxides also carry a small percentage of lead in places. In the sulphide ledge, at greater depth, the values, consisting of gold and copper, are found in a clean iron sulphide.

At the Sedalia the 700-foot shaft is being sunk deeper. When the 790-foot depth shall be reached, a station will be cut at that point to enable them to drift into the body of lead-carbonate and gold ore, which Manager Bartholomew is certain exists at that level, as a ledge of this character has been mined on the same level on the Resurrection, which adjoins the Sedalia. The workings in Resurrection, Sedalia and Fortune are connected.

The magnitude of leasing operations in Leadville are perhaps not fully appreciated. The great majority of the properties of the district are operated by individual lessees and leasing companies. Among the larger operations of this character are the Home group, Midas, Adams, Maid & Wolfe Tone, R. A. M., Mab, A. Y. & Minnie, Penn group, President, Big Six, Small Hopes, Midland, Silver Cord, Humboldt, Seneca Reserve, Valentine, Chippewa, as well as small leases which reach into hundreds. The term of the average Leadville lease is such as to warrant the lessee in thoroughly preparing for business. There are cases wherein leases run ten years and there are few which run less than three years. This, however, does not apply to the system adopted on a few properties where the owner company takes charge and lets specified blocks of ground to persons on the tribute plan, the company furnishing all material and doing the hoisting and hauling. Where the long-time lease is taken, the lessee furnishes everything required, and, as in such cases as the A. M. & W., often spends thousands of dollars for machinery. The royalties paid by lessees, of course, vary considerably, but in most cases they are doubtless between 5% and 25%.

The Ibex, Greenback, Dolly B., Diamond, Fortune, Iron-Silver, Louisville, Sixth Street and Welden are the principal mines whose operations are managed by the owners direct. WASCOTT.

Leadville, June 2.

Post: At Leadville bismuth ore is still coming out of the Ballard, but the production is by no means as large as it might be. There is a ring of English and German speculators who control the market, and it is to their advantage to keep the production at a minimum. They have the absolute control of both the sources of production and the agencies of consumption, and should a rival start in the business they are prepared to freeze him out. Leadville could, probably, produce enough bismuth to supply the world.

Leadville is daily shipping 300 tons zinc to Europe via Galveston, Texas. The Maid and Henrietta mines have contracts with foreign zinc firms for large quantities.

TELLER COUNTY.

The Tenderfoot Hill Con. M. Co. will spend $50,000 in development work, and has let a contract for 400 feet of sinking on the Altamont group. A similar amount will be spent on the Deadwood group.

The Gazette reports bromide of silver in the Santa Rita mine in the granite formation, half a mile away from the eruptive rock. At a depth of 500 feet the ore runs eighty-five ounces gold and 200 ounces silver, smelter returns.

The management of Stratton's Independence have asked for rates on a production of 4000 tons a month for four years. During May the Independence sent 150 tons of mill ore daily to the plants of the Colorado-Philadelphia Co., averaging $30 a ton.

The Detroit mill of Independence has started. The ore is run through a set of rolls that reduce it to a third mesh, sampled and dried, then goes to a second set of rolls, where it is reduced to eight mesh. Thence it goes through a third set of rolls that grind it to thirty mesh, after which it goes through a pulverizer. During its journey through the pulverizer a dry chemical is mixed with the ore, and it leaves the pulverizer ground to 100 mesh and finer. There is no roasting. After leaving the pulverizer the pulp is sent down into the first four vats. The solution in the vats is at boiling point and in them the ore is prepared for the second set of vats. In the first set of vats the ore, in solution, is agitated for two hours, after which it goes to the second set and is treated for an hour. In this set of vats mercury is introduced. After leaving the second set of vats the pulp goes into settling tanks, thence over concentrating tables, a mechanical system of amalgamation. The pulp, after leaving the pulverizer, all passes through an iron cylinder 10 feet in diameter.

Victor Record: The Union Co. has decided to do its own work hereafter, O'Malley & Co.'s contract being the last to expire. Most of the upper ore measures have been exhausted, so it has been decided to explore greater depths.——Manager Frankenberg of the Modoc has shipped a car of ore that contained twenty-five tons, valued at $1000 per ton. It went to Pueblo, effectually guarded by workmen and officers.

IDAHO.

ADA COUNTY.

Boise World: The final negotiation in connection with the deal for the Atlanta group has been made. There are five claims. The purchasers have, aside from the purchase price, money for development and equipment. This will include the erection of a stamp mill and a cyanide plant. The Idaho Midland has agreed to build a spur 7 miles long to the property.

SHOSHONE COUNTY.

The Alice group, Ready gulch, near Wallace, has been bonded by Finch & Campbell of Spokane for $50,000.

WASHINGTON COUNTY.

Gold dredging on the Snake is active. Last week, 12 miles above where the Boise empties into the Snake, a new dredger was put in. The sand is brought from the bar to the dredger by buckets on a chain, and there dumped into the sluices after passing over a set of grizzlies. The sluice is horseshoe-shaped, extending completely around the inside of the boat. At intervals along the sluice are slides on which the water is so diverted as to deposit the black sand and finer gold, while the coarse material is caught as ordinarily. At the back end of the boat is an old-time Spanish arrastra, and into this is scraped the material collected upon the slides. The arrastra is similar to those in the early days, excepting that a larger quantity of quicksilver is used.

MONTANA.

BEAVERHEAD COUNTY.

The Gold Dredge M. Co. has 3 miles of placer ground on Grasshopper creek, near Bannack. L. C. Bonney, manager, and M. McDonald, superintendent, to a Standard reporter say they have two boats, costing about $50,000 each, working about a mile apart, one operated by water and electricity, the other by steam. Each boat is 102 feet by 36 feet; the machinery on each weighs 300 tons. The booms from which the dredge buckets or scoops work have a sweep of about 300 feet, the width of the paystreak along the creek. The grade is 1%. A small dam is sufficient to hold water in check to float the boats and they make their own channel and construct their own dam. Each boat handles 2100 cubic yards of earth a day; the pay averages 25 cents a yard. It costs $200 a day to run the dredges.

DEER LODGE COUNTY.

Toole & Twohy have contracts aggregating $250,000 for work in connection with the erection of the new smelting plant southeast of Anaconda, one for the excavation for and construction of the foundation walls of the new works; about 100,000 yards of earth and rock will be excavated for the foundation; the walls aggregate about 25,000 cubic yards stone. The other contract is for about ten miles railway track for the new works, connecting with the B., A. & P.

MADISON COUNTY.

W. Dickinson is Supt. German Bar M. Co., near Laurin.

Work at the Pole Creek placers, near Red Bluff, has been suspended temporarily, says the Pony Sentinel. This was not due to any fault of the mines, but owing to the inexperience of B. Ryan, who was sent out there from Toronto, Canada, to manage them. Mr. Tanner negotiated a deal for the sale of the Pole Creek placers several months ago, the purchase price being $80,000. The Toronto man, Bernard Ryan, a son of one of the capitalists, was sent out there to operate the mines, and with the usual success of inexperienced men he made a failure of it. The company expended $20,000 in preliminary work. They have 2000 inches of water with two hydraulic giants and a fall of 260 feet. A. W. Tanner will resume work on the properties.

SILVER BOW COUNTY.

At the annual meeting of the stockholders of the Parrot Silver & Copper Co., in Butte, General Manager Gallway submitted the following report to the stockholders for the year ending April 30, 1900:

ASSETS.

Permanent investment	$ 732,168 56
Mine property	891,978 63
Bridgeport Copper Co. stock	498,500 00
Treasury stock	1,500 00
New works investment	721,050 75
Copper and silver on hand at Bridgeport	13,381 88
Cash	8,030 90
Bridgeport Copper Co	71,268 98
C. D. Burrage, treasurer	651,747 20
Sundry accounts receivable	168,407 64
Supplies on hand at Butte	9,524 00
Total	$3,767,558 54

LIABILITIES.

Capital stock	$2,300,000 00
Sundry accounts payable	63,323 52
Surplus	1,404,235 02
Total	$3,767,558 54
Surplus May 1, 1899	1,898,964 47
Net gains to April 30, 1900	884,370 55
Total	$2,783,335 02
Dividends paid year ending April 30, 1900	$1,379,100 00
Surplus April 30, 1900	$1,404,235 02

The Montana Ore Purchasing Co. has put 250 men to work on the Pennsylvania vein.

Geo. Robertson, Supt. Park Canyon M. Co., has begun work on the Homestake mine.

A Butte dispatch of the 13th inst. says: During Miners' Union Day exercises letters were read from W. A. Clark and F. A. Heinze, granting the miners in their employ their request for an eight-hour working day. In his letter Senator Clark says: "I realize the hazardous character of labor in the mines, and that it increases with depth of the working by reason of difficulty of ventilation and other reasons. I am satisfied that the demand for shortening the time for a day's work to eight hours in all underground workings is not an unreasonable one, and I have given instructions to the superintendents of all my mines to adopt the eight-hour system, beginning the 15th inst." The Heinze letter says: "It is undoubtedly a fact that no occupation is more hazardous than that of the underground miner. He assumes more risks than other laborers, and the accidents to which he is subjected are most disastrous. The profits of those engaged in mining have greatly increased in the last few years through the rise in the price of copper, but the underground miner has had no share in this prosperity. On and after to-day, the anniversary of the Butte Miners' Union, the miners in the employ of all mines in which I have a controlling voice shall receive the present scale of wages for a day's work of eight hours."

NEVADA.

ELKO COUNTY.

Salt Lake hears that the negotiations for the sale of the Dexter and Tuscarora companies, Nevada properties, are going on—the Dexter at $3 per share, or $600,000, and the Tuscarora at $250,000.

LINCOLN COUNTY.

F. Sizer of Butte has made a report on the April Fool mine of De Lamar. Six tunnels have been run in on the vein, the lowest one being known as No. 6, which is in some 3000 feet. From this tunnel a shaft has been sunk and two levels cut upon it, drifting both ways on the vein. The ore in these levels averages from one to one and one-half ounces in gold, and a large body has been blocked out.

On hearing of the recent fire at DeLamar, Capt. DeLamar cabled from Paris to his agent at DeLamar to see that every one who had lost by the fire was relieved and that there must be no suffering allowed. Work was also furnished to every one in the camp that desired it.

LYON COUNTY.

C. T. McHenry of Butte, Mont., is at Yerington, to develop the Bluestone copper location. He represents the Excelsior M. Co. of Butte.

STOREY COUNTY.

The Crown Point M. Co. will sell the hoisting and other machinery, the works to be dismantled, underground work in that mine to be prosecuted through the Yellow Jacket and Belcher shafts.

WASHOE COUNTY.

Work has begun on the Red Cloud mine, 20 miles north of Reno, where native quicksilver has been found.

WHITE PINE COUNTY.

The Ely M. & M. Co. at Ely has decided to give $10,000 for three claims adjoining their properties—the Florida, Dauntless and Quadrant claims, owned by D. E. McDonald of Ely.

Tribune: Experts are examining the Paul copper properties at West Camp in the interest of Senator Clark of Montana.

NEW MEXICO.

SANTA FE COUNTY.

T. J. McLaughlin, Supt. Santa Fe G. & C. Co. at San Pedro, has decided to make the new smelter, which this company is now building at San Pedro, of 250 tons daily capacity, and the machinery is designed to treat ores 2½% copper at a profit.

Mayo is erecting a 100-ton chlorination mill to treat the gold-copper ores on the Cullen group.

Supt. Woodworth is putting a 20-stamp mill on the Tuerto, west of Golden.

SOUTH DAKOTA.

CUSTER COUNTY.

At the Crown Hill mine, Supt. Young has begun running the new 50-ton concentrating plant at the Spokane mine, 6 miles south of Keystone. The ore is galena; concentrates 60% lead, 30% silver; value, $60 per ton. The ore is concentrated, sacked and shipped to smelter at Omaha.

At Custer, the New York mica mine is considered the largest mica proposition in the United States. The mica bearing ledge is about 800 feet long and 50 feet wide, being a vertical formation. The mine may be sold to the Chicago Mica Co.

The second payment on the 365 acres of mining ground in the Ragged Top district by the Spearfish M. Co. was made last week. The price of the property includes the 25-ton cyanide plant. The company expects to begin work on a 100-ton cyanide plant.

UTAH.

BEAVER COUNTY.

The Imperial Copper M. Co. of Frisco, is opening the mine at three points, working double shifts on each, finding ore in the three places.

JUAB COUNTY.

The Eureka Hill has resumed and sixty

of the 100 stamps are dropping. The mill is in charge of J. J. Pilgerrim. Supt. Watson has enough ore blocked out in the mine to feed the mill.

The Eureka Miner says there seems little prospect that stamps will be added to the Bullion-Beck mill in the near future. The company has about 15,000 tons of milling ore on the dump, which is being added to daily. The metallic contents are about 2% copper, 10% lead and 12 ounces silver, and with fair smelting charges the lot could be shipped at a profit.

SALT LAKE COUNTY.

Zinc-lead ore is reported in the Winnamuck mine, Bingham. J. Campbell tells the Tribune it assays 21% zinc, 17% lead, 15 ounces silver and $1 gold. He sent 500 pounds of ore to Denver; the test was made there on a Cammett concentrating table, making a separation of the zinc from the lead; the lead product assayed 48% lead, 9% zinc and 15 ounces silver; the zinc product 26% zinc, 2% lead and 3 ounces silver. The concentration was three to one. Both products carry 14% iron.

At a recent meeting of Utah lead producers in Salt Lake City, reported by the Tribune, J. L. Bamberger said that a few of the Western lead producers in Utah, Idaho and Montana had united some time ago, and by their combined effort had been able to maintain the price of lead for about three months in the neighborhood of $4.57½ per hundred. The cause of the recent slump in price was the refusal of the Missouri lead producers to share any portion of the burden, while they were unloading all the lead they could mine at the price which was being maintained by the Western producers. He stated that there was about 250,000 tons of lead produced in the United States every year. All of this product is consumed in this country, except about 10% of the total, or 25,000 tons per annum, which accumulates as a surplus. The smelting companies have to hold this surplus or export it at a loss when lead is $4.25 per hundred or over. To take care of this surplus it was proposed that each lead producer contribute so much per ton for the metallic lead contained in their ores, to be used for the purpose of protecting the loss on the 10% surplus above mentioned, which must be exported; when lead reaches $4.25 per 100 lbs. the amount contributed by the lead miners to be $1 per ton; when lead goes to $4.50 per 100 lbs. the contribution to be $2 per ton, and when it reaches $4.65 per 100 pounds or more, then the assessment to be $3 per ton for metallic lead produced by each mine, the smelter people to have nothing to do with the management of the business, the lead producers to form a national organization and direct its affairs, the only part the smelters to have in the transaction being to retain the schedule assessment out of each lot of silver-lead ore and pay it over to the proper officers of the Lead Producers' Association, this to be in accordance with a properly executed authorization by each member of the association. He stated that the difference in a beneficial way to the Utah lead producers would amount to from $50,000 to $60,000 per month, while the expense to the mine owner would be very light; only a few cents per 100 pounds on the lead produced, and that the maintenance of the price of metallic lead would not affect the price of white lead, that had remained the same regardless of the price of metallic lead during the past year or more.

On the 5th inst. local lead producers made a provisionary compact agreeing to the plan outlined above.

Meanwhile in some instances lead producers are storing their high-grade lead ores in the stopes and drifts until such time as the market will afford a profitable margin.

SUMMIT COUNTY.

Park Record: J. B. Fleming, foreman Silver King mill, will draw up specifications for the new Silver King sampler that is to be erected as soon as possible.

Following are the shipments of ore from the Mackintosh sampler for the past week:

	Pounds.
Silver King	1,085,000
Daly West	949,000
Anchor Con	342,000
Ontario	190,000
Apex	79,000
Valeo	31,000
Loring Bros.	35,000
Total	2,711,000

WASHINGTON.

KITTITAS COUNTY.

Supt. Boggs at Blewett is reported to have "invented a new cyanide process, and turning out a gold brick valued at from $1000 to $1500 every two weeks from the tailings of the stamp mill."

The Peshastin M. Co. has struck its objective lead.

At Liberty there is considerable activity in placer mining, little in rock work. Mr. Engle is the principal owner of placer ground there. The placer gold of Liberty is coarse, while the gravel is largely slate.

SNOHOMISH COUNTY.

The Wilbur mine, Index district, has been leased to T. McIntyre, vice-president and foreman of the company. He is working ten men.

STEVENS COUNTY.

The Eagle mine at Chewelah has resumed ore shipments.

FOREIGN.

AUSTRALIA.

London Mining Journal: The returns of the output of gold in the five great producing colonies for the March quarter of this year compare with those for the corresponding period as follows:

	March quarter, 1899. Crude ounces.	March quarter, 1900. Crude ounces.
Victoria	184,898	173,813
West Australia	316,753	387,617
Queensland	205,542	226,112
New South Wales	100,153	85,283
New Zealand	92,718	95,479
Totals	900,064	968,304

The increase of 68,240 ounces is entirely accounted for by West Australia, whose increase is 70,864 ounces for the quarter, Victoria having decreased 11,085 ounces.

The Mines Department of South Australia has prepared a statement of the quantity and value of minerals produced and exported from that colony during the past four years. The following figures are of general interest: In 1896 exports were valued at £237,857, and this has risen to £451,611 in 1899. The smallest gold export for the period mentioned was in 1898, when 2798 ounces, valued at £10,676, left the colony. The largest gold export for the period was in 1897, when £39,020 worth was sent outward.

BRITISH COLUMBIA.

At Sandon the Slocan Star mine is partly closed down. B. N. White, general manager, from Minneapolis gave instructions to shut the mill down and cut the force in the mine to forty men. He then left for White Horse Rapids district in Alaska. The Slocan Star mine was employing 108 men.

The Emily Edith group near Silverton is to be taken over by an English company for $275,000. The nominal capital of the new company has been placed at $375,000. J. D. Kendall, on whose report the deal is made, says: "The contour of the ground in regard to the veins is such that the latter can be readily reached by tunnels for a long time to come. The strata are soft and cheaply worked, wages are as usual in the West, timber is abundant and ample water can be obtained for both dressing and power purposes."

At Rossland the Le Roi M. Co. is calling for tenders for a third forty-drill compressor. There is now in use one forty-drill and one twelve-drill compressor and the second forty-drill machine is being installed.

In the Slocan the force on the Last Chance has been increased to seventy-five men, and a car of ore a day is being sent down the hill. The long tunnel to get the depth on the property is being driven. New buildings, when finished, will give accommodation for 150 men.

Supt. Graham of the Waterloo mine, from Camp McKinney, has a gold brick weighing 106 ounces, the result of twenty-two days' mill run for May, valued at $1480.

In the Ainsworth district the Stevenson Tunnel Co. has a water power and compressor of its own, but finds it cheaper to buy the power. The prices charged are $3 per day for each drill, $4 for pumps (No. 6 or less), and $4 for small hoists. Other mines buying this power are the Tariff, No. 1 and Star.

In the Slocan there are 100 men at work on the Payne mine. A new power drill has been put in. At the Whitewater the force is also about 100 men.

Following are the shipments from the Rossland mines for 1900 to June 1:

	Tons.
Le Roi	35,962
War Eagle	10,603
Center Star	7,617.5
Iron Mask	1,434.5
Evening Star	356
Monte Christo	273
I. X. L.	266
Iron Colt	50
Giant	42
Total	56,004

At the Le Roi 600 tons of ore a day is being extracted from the stopes. It is the intention to go down to the 1000-foot mark as soon as the shaft is completed to the 900 level. Preparations are under way to put an aerial tramway to the Black Bear flat.

A machine drill run by air direct from a column of water is being operated by Supt. Knowles at the Philadelphia mine at Ainsworth. The compressor consists of an upright pipe at the side of a hill, giving a fall of 107 feet. Under this a shaft has been sunk about 2000 feet, so that the full drop is over 300 feet. The water, in dropping, carries with it air. From the bottom of the shaft the water escapes into a vessel, where the air rises to the top and the water escapes from under it to the surface. The body of water from the vessel to the surface gives a pressure of about eight pounds to the inch to the air, which escapes to the pipes from the top of the tank. Mr. Knowles says: "The drill is 12,000 feet from the compressor, which is on Coffee creek. It is started without a hitch and with eighty-five pounds air pressure at the drill. This pressure is maintained at all times."

MEXICO.

Two Republics: H. M. Diffenback, manager Monterey smelter, controlled by the Guggenheim interest, has returned from Juarez, in Chihuahua, where he had been in consultation with Willard S. Morse, general manager of the Guggenheim interests, relative to the starting up of the Juarez smelter owned by the company, and says: "It is probable the Juarez smelter will resume operations. It closed down because the supply of lead ore from the company's mines ran short. But last month the output of the mines was 6000 tons of ore carrying an abundance of lead. We believe this output can be very materially increased and our expert is now examining the mines to report on them. While it is very likely our present plans will be carried into execution, still the matter has not been definitely settled. We are planning to add to the Juarez plant two copper matte furnaces of twenty tons daily capacity each. There is a great deal of copper ore being found in northern Mexico and a considerable quantity of it is being shipped through El Paso to Denver for treatment. We want two furnaces to handle this ore."

SOUTH AFRICA.

A special correspondent of the London Daily Mail writes that a journey along the Rand is a depressing experience. Everywhere is a strange silence, now that the thud of the battery stamps and the clatter of the hauling gear are stilled. The tailing heaps lie white as skeletons upon the track, and the gaunt headgears point bony fingers to the sky. The Golconda has become a Golgotha, in which rust and curruption are the only active agencies and decay alone is king. At long intervals a listless chimney floats a smoky pennant to the sky as a sign that there a privileged engineer is fighting the canker with his pumps. But the number of these is small and wholly inadequate to dispel the general impression of a charnel house. Wagon ways, deserted by their supports, hang fantastically festooned or draggle sluttishly across the heaps of ore. In the shafts the water has reached its level, and is noiselessly, remorselessly picking out the pit supports and obliterating the existence of crosscuts.

While such is the scene presented to the passing observer, to the mining expert little damage of a permanent character reveals itself.

The mines have been gathered into four groups:

1. The mines seized by the Government and worked by its officials.

2. Mines in which work was never stopped or was early resumed by the proprietorial companies.

3. Mines in which operations have ceased, but which have received permission to pump

4. Mines in which work has ceased and which have been refused permission to pump.

1. The mines worked by the Government are the Robinson, Bonanza, Ferreira Deep, Rose Deep and Crown Reef. All are in full working order except the Rose Deep. The Robinson is treating concentrates as well as crushing ore.

To take the place of the board of directors the Government has appointed a special commission to superintend operations. This consists of the four State officials, Messrs. Klynhaus, Munnik, Minnaar and Van Alphen, and the Uitlanders, Messrs. Wagner, Boucher and Gordon. The monthly returns, approximating as they do those obtained before the war, seem to show that these gentlemen have successfully withstood the temptation to work out only the best ore, and have taken it in its legitimate order.

Thirty per cent of the gross production of these five mines is, by law, forfeit to the Government, although the right has not been exercised.

2. Seven mines are still worked by the proprietorial companies—Ferreira, Wemmer, Village Main Reef, Worcester, Pioneer, Geldenhuis Estate and Langlaagte Deep.

The gold obtained from these mines is delivered in its entirety to the State mint, from which a receipt is obtained for the total amount, less the cost of labor advanced in money. Thirty per cent of the gross output is forfeit to the Government under the conditions already detailed.

Many mines which would have been found in this group have been prevented by the fact that their cost of production, exceeding 60%, has proved prohibitive.

To superintend operations, each of these working companies has a quorum of directors on the spot.

The Geldenhuis Estate, being short of natives, is unable to work full time, and is on the brink of shutting down.

The Langlaagte Deep, although included among the working mines, is merely engaged crushing some eighty heaps of accumulated ore and in pumping operations.

3. Thirty-one mines have received permission from the Government to pump, although actual mining has ceased. Twenty-six of these are accounted French or German mines, and have received the privilege as a compliment to their nationality. At least one-half of the total shares of a company must be in the hands of Continental investors to qualify for this concession.

The mines designated "French mines" are: Champ d'Or, French Rand, Durban Roodepoort Deep, Main Reef Consolidated, Pearl Central, Langlaagte Estate, Jumpers, Jumpers Deep, Crown Deep, Wolhuter, Henry Nourse, Treasury, New Kleinfontein, New Modderfontein and Van Ryn.

The German mines consist of: West Rand York, Lancaster West, Princess Estate, Roodepoort Central Deep, Roodepoort United, Durban Roodepoort, Meyer and Charlton, New Goch and May Consolidated.

In addition to these, five English companies have received permission to pump, since inundation of their properties would endanger neighboring mines at work for the mint.

These are: Salisbury, Jubilee, City and Suburban, New Primrose and Glencairn.

Of these mines, only a few are endeavoring to pump dry. The majority are content to confine the water to the deeper workings and to prevent its reaching the upper or oxidized zone, where crumbling is most to be feared.

Engineers are divided in their opinion as to the economy of pumping. Some hold that it will prove cheaper to exhaust at a single operation than to maintain continuous pumping; others that the cost of repair of shafts, galleries and inclines in a flooded mine will far exceed the expense of persistent pumping. One engineer says that to pump 600 feet cost him $10,000 per month and he did not consider the expenditure justified. Many mines are flooded to within 250 feet of the surface, all trucks, railways and movable plant having been hauled above water level.

It is evident that the only person competent to decide the vital question whether to pump or not to pump is he who knows every detail of the workings of the mine. He must know the friability of the upper or oxidized zone, where subsidences are more probable than in the pyritic zone; the condition of the shafts, inclines and crosscuts; and the dependence to be placed upon the woodwork and the pit props. In the majority of cases the man best able to judge is absent, and in many permission to pump has not been granted because none remained to apply for it.

The great advantage of possessing this permission is the opportunity it gives of maintaining on the spot a staff of competent men who can keep machinery bright, execute repairs and preserve the surface plant in fair working order. That privilege many sanguine managers wilfully threw away, remarking that, for the length of time they would be absent, it was not worth while making application. There are cases in which no attempt was made to leave affairs in decent order, the men throwing down their picks and drills where they stood, and abandoning the wagons with their last loads still upon them. Political precipitancy had overcome professional discretion.

SOUTH AMERICA.

From a subscriber comes the following: It is generally believed that the Guyanas, South America, are rich in gold. Such, however, is not the case. It is the old saying, "distance lends enchantment, etc.," also these far away sections afford to the man with a shoestring a better opportunity of getting in his work. Gold is found in both quartz and alluvial wash. The veins of quartz are small, and of blanket nature, and wherever uncovered and free from soil, are broken up and disin-

tegrated. From this part of the veins is derived their alluvial gravel, as they call it, which is nothing but a bed of disintegrated quartz.

The whole surface of most of these sections, or countries, for say 200 miles from the coast, is overlaid with a superficial formation, which is composed of clays, sands, gravel and boulders, principally clays. The alluvial gold-bearing wash is very shallow, from 6 to 36 inches, and clay bed. This runs on an average about $2.50 per cubic yard. The gold is very light and flakey and you save by best native methods 40%. This loss is due to several causes which cannot be overcome, first the fineness and light character of the gold, and second, the excess of clays. Most of the companies operating on a large scale that have undertaken by improved mechanical devices to discount the native saving, are still in a query. The quartz veins average probably $8. Both the quartz veins and alluvial wash contain pockets of exceptionally rich values, but these are rare instances.

The climate is not the best; it rains continuously, and before and after showers it is very hot. Malaria caused from the unhealthy exhalations from the wet lands and bad air produces fevers, agues, etc., to which every one is more or less subject. The nights are not bad and one could sleep if permitted by the mosquitos, of which there are several well developed species.

Living is very expensive; common hotel fare in Demerara (English country) is $2.50 per day. This is simply a sleeping and eating price. Then once each week or oftener you must "give up" to all the help that the proprietor rings in on you. So really you never know what it has cost you. You only know you are broke. I have figured how to beat this game, so the readers will save money by following my advice; it is simple: "Buy the hotel." In Dutch Guyana the rate is $2 per day—you help yourself to nothing. The most satisfactory way to exist here is to get a place of your own. To do this and live will cost at least $100 per month. French Guyana is not worth considering. There is no money to be made out of mines in any of these countries, and to come under contract nothing less than $500 per month (U. S. gold) is worthy of entertaining, and then only on short terms.

THE KLONDIKE.

The Dawson Daily News, copies of which came out by the latest Dawson mails, places the estimate for the season's clean-up on the Klondike at $18,553,270. There are a total of 560 dumps that are calculated to show an average of 10 cents to the pan. Over 5000 men are employed on the various creeks. Of the creeks, El Dorado leads with an output placed at $3,746,200.

The steamer A. F. Gustin left Dawson June 4th for St. Michael, carrying $2,000,000 in gold dust. She is expected to connect with the Zealandia at St. Michael for San Francisco.

FOLLOWING is a synopsis of the programme of the International Mining Congress to be held at Milwaukee, Wis., June 19th–23d: Tuesday, June 19th, 2 P. M.—Opening of convention in Exposition building; call to order; prayer by D. T. Denman; opening address by president; address by Gov. Scofield; address by Mayor Rose; response; address of president.

June 20th, 10 A. M.–2 P. M.—Permanent organization; appointment of committees. Papers to be read—Department of Mining, L. B. Prince, Santa Fe, New Mexico; Public Survey of Mineral Lands, P. Clagstone, Stehekin, Wash.; Lead and Zinc Industry in Missouri, E. M. Shepard, Springfield, Mo.; Progress and Development of Mining in Western Ontario, T. R. Deacon, Rat Portage, Ontario.

June 21st, 10 A. M.—Papers—Mining in the East, J. W. Postgate, New York; Mines and Minerals of Southern Wisconsin, R. Kennedy, Highland, Wis.; Revision of Mining Laws, C. J. Moore, Cripple Creek, Colo.; Why Women Should Interest Themselves in Mining, Mrs. E. C. Attwood, Empire, Colo.

June 22d, 10 A. M.—Papers—Wisconsin Building Stones, E. R. Buckley, Madison, Wis.; Mining as an Investment, N. C. Westerfield, St. Paul, Minn.; Copper Mining in Northern Wisconsin, K. Thomas, West Superior, Wis.; Tennessee as a Mining Field, H. V. Maxwell, Knoxville, Tenn.

June 23d, 10 A. M.—Papers—Treatment of Ores, L. D. Godshall, Spokane, Wash.; Mining, Mine Managers and Inspectors of Mines, H. J. Brennan, Carbondale, Pa.; election of officers; closing.

Personal.

M. HODGE is now Supt. Princess Maud mine, Republic, Wash.

R. CURTIS SR. has been appointed foreman Union mine, Nevada Co., Cal.

E. E. CHASE, E. M., Denver, Colo., recently spent some time at Kelly, N. M.

JNO. A. CHURCH of New York City is inspecting California mining property.

J. L. GRIMES is now Supt. Bellevue Con. Co., Bellevue mine, Placer Co., Cal.

DAVID KEITH has resigned as manager of the Anchor M. Co., Park City, Utah.

O. P. POSEY, of the Cochiti, N. M., G. M. Co., has gone to Boston, thence to London.

T. H. OXNAM leaves California on the 18th inst. for Paris, to be absent till Nov. 1st.

J. A. SNEDAKER of Denver, Colo., returned last week from a trip through central Nevada.

WM. MAGENAU is now connected with the cyanide plant of the Dexter G. M. Co., Tuscarora, Nev.

W. C. POTTER is appointed as special California mining representative of the Santa Fe Ry. Co.

EDWARD R. POOL has opened a sales agency for the American Steel & Wire Co. in Denver, Colo.

H. A. COHEN is inspecting Capt. De Lamar's California properties in San Bernardino and Shasta counties.

G. W. HULL AND E. D. TREADWELL have returned to Jerome, Arizona, the former from Boston, Mass., and the latter from California.

A. E. LINDROOTH, Denver representative of the Link-Belt Machinery Co., recently returned to Denver from Arizona and New Mexico.

J. N. BISSELL, general agent Mexico Mine & Smelter Supply Co. at Oaxaca, Mexico, has returned to that city from a visit to the capital.

GEORGE KISLINGBURY of Shasta, Cal., has gone to Idaho to examine mine property for J. R. DeLamar, returning thence to Baker county, Or.

W. A. KNAPP, Supt. Bellwether mine, Amador Co., Cal., is at La Grange, Mariposa Co., removing a mill and hoist to the Amador Co. property.

H. A. COHEN will probably be the general manager of the Consolidated Golden Gate & Mercur, Utah, mines. The new arrangement goes into effect July 1.

F. F. SHARPLESS goes from Dalton, Madera county, Cal., to West Chester, Penn., thence returns to California, from whence he goes to southeastern Alaska.

WARREN C. BOGUE, general manager Utah branch of the Mine & Smelter Supply Co. of Denver, Colo., has returned to Salt Lake City from Summit county, Utah.

L. C. BONNEY, general manager G. D. M. Co., Bannack, Montana, goes in August to Venezuela, S. A., where his company has concessions of placer ground to work by dredger.

MISS CAROLINE VAN BRUNT is secretary Oxford Copper Co., 99 John St., New York City, and takes personal charge of the metallurgical laboratory. Colorado, Utah, California and Arizona each furnish women mine superintendents, and in California are two young women who conduct assay offices.

W. L. WATTS, California State Mine Examiner, is at work in San Diego and Los Angeles counties; W. H. Storms, Assistant State Mine Examiner, is this week in Tuolumne Co., and goes thence to Sierra Co. S. M. Bowers is in Plumas Co.; F. M. Anderson has been assigned Shasta, Siskiyou and Trinity counties.

F. M. JOHNSON, Gen. Mgr. Albemarle, N. M., mill is in San Francisco. He plans a new 350-ton mill for the Star mine. In connection with this mill it is locally stated in the latter part of '99 the Navajo people sent notices to seven mine machinery manufacturers, inviting bids on material for their 350-ton mill. Six out of the seven firms replied that they had orders on hand that would occupy their attention for twelve months, and declined to make bids. One Chicago company agreed to take the contract for September delivery if paid a premium of $3000 on the contract price, or would forfeit $3000 if they failed. About June 1 they notified the manager that their rush orders were so far behind that they could not supply the machinery, and would pay the forfeit of $3000. The company hopes to place its contract, so that the new mill machinery may be got on the ground by the close of the century.

Catalogues Received.

No. 41 of the series issued by the M. C. Bullock Mfg. Co. of Chicago, Ill., treats of the Bravo hand-power diamond drill. The M. C. Bullock Co. style it "The Prospector's Friend." The catalogue illustrates and describes this hand-power diamond drill and will be sent to any one asking for it.

Commercial Paragraphs.

THE Dillon Iron Works, Denver, Colo., are enlarging their shop facilities.

C. S. BURT has opened an office in Denver, Colo., for the Bethlehem Steel Co., of South Bethlehem, Pa.

G. E. WOODBURY, of San Francisco, is in Colorado, where his new pattern concentrator is being introduced.

J. S. J. LALLIE has removed his surveying instrument establishment to the Arapahoe Building, Denver, Colo.

THE Risdon Iron Works of San Francisco is placing its new rolling mills in continuous operation to furnish structural steel and iron.

THE E. P. Allis Co., Milwaukee, Wis., has the contract for the new 100-ton cyanide plant at the Camp Bird mine, Ouray, Colo.

THE Sonora R. R. Co., has published an illustrated pamphlet descriptive of the country and industries along its line from Nogales to Guaymas, in Sonora, Mexico.

THE Griffin Wheel Co., of Chicago, have a plant and a branch office at Denver, Colo. Vice-president Wales, of this company, is at present in San Francisco.

THE Weigele Pipe Works, at Denver, Colo., have filled orders for about 26,000 feet of pipe for water power and placer work and have orders for six weeks work ahead.

THE Geo. E. Dow Pumping Engine Co. succeeds the Dow Steam Pump Works, 108–120 Beale St., San Francisco, with enlarged quarters and improved facilities for the manufacture of mine pumps.

THE Union Iron Works of San Francisco has bought 275 feet square, corner Second and Folsom streets, San Francisco, to establish thereon an auxiliary plant for the manufacture of mining machinery.

THE Board of Supervisors of Trinity county, Cal., want bids for furnishing the county with 5-inch pipe, No. 18 iron, 3500 feet in length; also separate bids for 5-inch (casing) pipe (dipped), 3500 feet in length; bids to be in by July 10, 1900.

THE trusts are proving a good thing for the Burt Manufacturing Co., Akron, Ohio. Among their recent shipments are Cross oil filters for the Carnegie Steel Co., American Steel Hoop Co., the American Sheet Steel Co., and their fourteenth order for the American Tin Plate Co.

F. W. BRAUN & CO., of Los Angeles, Cal., write that with the Cary burner and combination furnace it is possible to melt and cupel 144 assays in twelve hours with five gallons of gasoline. One burner operates both compartments simultaneously. They furnish catalogues giving particulars for assayers.

BAILY & MONNIG, managers of the State Ore Sampling Co., who are buyers of the rare metals, state that tungsten, brought to that market, comes mainly from near Silverton, Colo.; that uranium, in yellow oxide form, comes from the Paradox valley, Colo., the black sulphide from Gilpin county. They get considerable bismuth from Leadville.

W. H. EMANUEL, Denver, Colo., reports the following recent sales of machinery: A seven-drill Rand cross-compound steam and air compressor to the Independence Town & M. Co., at Independence, Cripple Creek district; also a 1,500,000-gallon Worthington compound packed-plunger pump to the city of Grand Junction, Colo.; and several Rand air drills of different sizes to mines in Colorado and New Mexico; also two 80 H. P. tubular boilers, with 6x4x6 Worthington boilor-feed pumps to the Gold King M. & M. Co., at Silverton, Colo.

THE Colorado Iron Works have orders in hand for the following equipment: A 200-ton copper smelter for H. H. Hoffman, Sonora, Mexico; 48 U-pipe hot-blast stove for smelter in Tennessee; a 36x51-inch silver-lead smelting furnace for Mexico; a 200-ton copper smelting plant, with Bretherton's patent hot-blast appliances, for the Kendrick & Gelder smelter at Silverton, Colo.; six double-bowl slag trucks for the Arkansas Valley smelter at Leadville; a 40-stamp crushing mill for J. H. Terry, at Silverton, Colo.; one set 42x6-inch high-speed rolls for British Columbia; a 5-stamp gold-milling plant for the B. O. B. M. & M. Co., in New Mexico; also a 5-stamp wet-crushing mill and appliances for the Lucky Strike G. M. Co., at Gunnison, Colo.

THE Daniel Best Manufacturing Co., San Leandro, Cal., has word of the arrival of the six steel freight wagons for use on the Trans-Siberian railway. The Best Manufacturing Co. meet with marked success in the manufacture of traction engines. Those thus supplied are each of 50 H. P., and will have a load of from thirty to fifty tons. The upright boilers are of 4 feet diameter, tested to 200 pounds, and have 48 square feet heating surface. To the boilers are attached wrought-iron bed plates 1x6 inches, forming the main frames of all the machinery. To these are attached twin engines 9-inch bore and 9-inch stroke, geared to the main inner cogged periphery of two large drive wheels. The height of the main drive wheels is 8 feet; the total weight of each is 13½ tons. The engines can be used stationary to furnish power at any point desired. The water tank is of 500 gallons capacity; coal, oil or wood may be used as fuel.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING JUNE 5, 1900.

650,889.—SWATH CLEANER—H. A. Abrott, Sunol, Cal.
651,289.—WATER COCK—J. P. Benton, Dalles, Or.
651,101.—WATER WHEEL BUCKET—F. R. Brown, Unga, Alaska.
651,104.—ENVELOPE—W. H. L. Corran, S. F.
651,006.—CONCENTRATOR—S. T. Curtis, Virginia, Nev.
651,106.—LADDER—I. M. Dillman, Oakland, Cal.
651,009.—WEATHER STRIP—B. Erlandson, S. F.
651,327.—WAVE MOTOR—V. Gifford, Los Angeles, Cal.
650,941.—BICYCLE SADDLE POST—H. J. Kramer, Los Angeles, Cal.
651,192.—TICKET MACHINE—C. Landers, Tacoma, Wash.
650,946.—HAULING LOGS—Mason & Hart, Millwood, Cal.
651,017.—CARBURETOR—A. L. Navone, Calistoga, Cal.
650,985.—PUMP HEAD—R. J. Northam, Los Angeles, Cal.
651,086.—WHEEL—F. Prothero, Michigan Bar, Cal.
650,990.—RUG MAKING MACHINE—O. Rice, Oakland, Cal.
651,020.—HITCHING FETTER—Rommel & Owen, Los Angeles, Cal.
650,999.—SEPARATING SHELLS FROM KERNELS OF NUTS—J. F. Ulrichs, Alameda, Cal.
650,922.—GRAIN DRILL—A. V. Wilbur, Stockton, Cal.
651,286.—TRUCK LOCK—G. M. Williams, Santa Rosa, Cal.
651,002.—GAS GENERATOR—G. C. Wood, Applegate, Cal.
32,795.—DESIGN—J. Simonds, Berkeley, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CARBURETORS.—No. 651,017. June 5, 1900. A. L. Navone, Calistoga, Cal. This invention is designed to generate explosive vapor from suitable hydrocarbon liquids, and to mix the same with air in appropriate proportions. It comprises a generator having a heating pipe, an exterior case surrounding and supported upon the pipe, a spiral channel coiled and fitting around the pipe, with means for supplying a hydrocarbon liquid to the upper end and withdrawing the residue below. Means are also provided for supplying air to be mixed with the vapor as produced, with an adjusting device for regulating or cutting off the supply of air to be mixed with the vapor.

RUG SEWING MACHINE.—No. 650,990. June 5, 1900. Oliver Rice, Oakland, Cal. This invention relates to a machine which is especially designed for the manufacture of rugs. It consists in a novel mechanism by which the loops of the yarn are formed and engaged by a thread carried by a reciprocating needle so that each loop is given a proper height, and is tied or fastened by the thread of the needle. The machine comprises a transversely channeled table, a frame with rollers adapted to carry and transfer the rug base, a bar movable and guided in the table channel with oppositely toothed racks and mechanism whereby the rug carrier may be transferred alternately from one side to the other. A second bar is secured on top of the first named bar and separated from the latter to provide a space for the passage of the rug base and having vertically disposed comb teeth projecting from its front. A plate is adapted to strip

the loops of the comb plates after a row of loops has been completed. The fabric is then returned across the machine and a second row of loops is in like manner formed. A vertically pivoted hook is adapted to engage the yarn, this hook lying between spurs upon the front of a transversely movable and guided carriage, and this hook withdraws the yarn to form a loop. A vertically movable thread-carrying needle is reciprocated in unison with the movements of the looper and its thread is thus engaged with the yarn loop which at the same time is drawn down upon one of the comb plates and is tied or fastened by the thread so as to make the loops which form the surface of the rug uniform in length and appearance.

AUTOMATIC WEATHER STRIP FOR DOORS.—No. 651,009. June 5, 1900. B. Erlandson, San Francisco, Cal. This invention comprises a sealing strip adapted to close against the seal or surface below the door or window, a lever by which the strip is carried, and mechanism by which it is automatically actuated to depress the strip and make a tight joint when the door is closed and allowed to rise clear of its seat when the door is opened. It comprises a sealing strip, bars upon which it is carried movable within the channel in the lower part of the door, a centrally fulcrumed lever from one end of which said bars are secured, a contact plate by which the outer end of the lever is raised and a sealing strip depressed when the door is closed. A spring is located within the carrier and presses upon the top of the outer end of the lever whereby it is tilted and the sealing strip raised as soon as the door begins to open. There is an exterior casing with adjusting and locking screw whereby the carrier and connected parts are raised or depressed and locked in place.

CONCENTRATOR.—No. 651,006. June 5, 1900. S. T. Curtis, Virginia City, Nev. This invention relates to an apparatus which is designed for the concentration of valuable sulphurets and other heavy materials. It comprises a table, means by which it is freely suspended at a point between its ends and substantially balanced, means whereby the balance and the table are regulated, horizontal guides for the upper end of the table, and means for reciprocating the latter longitudinally. One end of the table is supported upon horizontal slidable bars, and an elastic concussion head is fitted against which the head of the table is caused to strike when reciprocated. Means are provided by which the table is reciprocated longitudinally, and a floor consisting of separate steps so disposed as to form broad approximately horizontal surfaces. These steps are cut backwardly to form recesses in which the material settles, and a receiving box or trough connects with the lower end of the table into which box the discharge is received. In conjunction with these features is a subdivided trough carried by the lower end of the table with means for discharging the material reaching that point upon opposite sides of the partition of the trough, fixed arms projecting into the trough so as to agitate and loosen the material and there are discharge pipes upon the bottom; an overflow from the outer edge of the trough and a screen by which said overflow is received, with passages by which the material received thereon is delivered from either side. There is a fixed apron upon which the material which passes through the screen is received, and a chute delivering said material on a vertically journaled pan, with means by which the pan is oscillated about its shaft. A central discharge pipe and stationary fingers projecting into the pan agitate the contents.

Recently Declared Mining Dividends.

Elkton Consolidated M. & M. Co., Colorado, 3 cents per share, $75,000	June 20
Last Dollar G. M. Co., Colorado, 2 cents per share, $30,000	July 5
Portland G. M. Co., Colorado, 2 cents per share, $60,000	June 15
Acacia G. M. Co., Colorado, 1 cent per share, $15,000	June 25
Daly-West, Utah, 25 cents per share, $37,500	June 15
Greater Gold Belt M. Co., Colorado, 2 cents per share, $70,000	June 20
Specimen G. M. Co., Colorado, 13¾ cents per share, $153,037.50	June 20
New York & Honduras Rosario M. Co., 10 cents per share	June 15

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: **EDWARD N. BREITUNG,**
MARQUETTE, MICH.

Latest Market Reports.

SAN FRANCISCO, June 14, 1900.

SILVER—Per oz., Troy: London, 27¾d (standard ounce, 925 fine); New York, bar silver, 60c (1000 fine); San Francisco, 60½c; Mexican dollars, 49½c.

COPPER.—New York: Lake, 1 to 3 casks, 16.50 cash; carload lots, 16.25; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.25; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $3.87½; Salt Lake City, 3.85; St. Louis, $3.75; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 7, sheet 8, bar 6c. London, £17 5s = 3.75c per lb.

SPELTER.—New York, $4.45; St. Louis, $4.55; San Francisco, ton lots, 5¾c; 100-lb lots, 6c.

ANTIMONY.—New York, 10c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, pig, No. 2, foundry, $20.90; gray forge, $18.25; San Francisco, bar, per lb., 3c.

STEEL.—Billets, Pittsburg, $27.50; sheet bars, $31.50; San Francisco, bar, 11c to 18c per lb.

QUICKSILVER.—New York, $51.00; London, £9 10s; San Francisco, local, $49.50 ℔ flask of 76½ lbs.; Export, $47.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER.—Half-and-half, 100-lb. lots, 20½c; San Francisco, Plumbers', 100-lb. lots, 17c.

BABBITT METAL.—San Francisco, No. 1, 10c.

TIN.—New York, pig, $30.00; San Francisco, ton lots, 31½c; 1000 lbs., 32c; 500 lbs., 33c; less, 34c; bar tin, ℔ lb, 37c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

BISMUTH.—New York, ℔ lb., $1.70 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

NICKEL.—New York, 50@60c ℔ lb.

TUNGSTEN.—New York, ℔ lb., $1; San Francisco, $1.25.

FERRO-TUNGSTEN.—New York, 37%, 40c; San Francisco, 75c (60%).

FERRO-MANGANESE.—Pittsburg, 80%, $125.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ℔ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 33@35c ℔ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 66° B, 2c ℔ lb.; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.: chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 45@50c ℔ lb.

COAL.—San Francisco coast, yard prices: Wellington, $8; Seattle, $6.00; Coos Bay, $5.50; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $9; Cannel, $11.00; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 14, 1900.

9:30 A. M. SESSION.

100 Alpha.....03c	100 Mexican.....21c
200 Alta.....04c	10 Ophir.....78c
100 B. & B.....28c	100 Overman....18c
100 C. C. & V.$1 55	

2:30 P. M. SESSION.

200 Ophir.....77c	500 Chollar.....21c
200 Mexican.....22c	400 Y. Jacket...14c
200 C. C.& V..$1 55	200 Alta.....03c

SITUATIONS WANTED.

WANTED—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

MINE SUPERINTENDENT, TEN YEARS' experience in Michigan, Montana and Idaho, desires engagement as Supt. or manager of developing or producing property in this country or abroad. Best of reference. Address D. C., care this office

POSITION WANTED TO MANAGE A MINE and mill. Years of experience. Thoroughly practical, pushing and energetic. Handle men with skill and economy. First class testimonials as to integrity, etc. Address SKILL, this office.

SITUATION WANTED BY EXPERIENCED ore dresser and millman. Licensed steam engineer. Familiar with both continuous and alternating current apparatus. Mexico only. Address SIZING, care this office.

WANTED.

WANTED.—Two 5-Foot Huntington Mills.
Must be in perfect condition. Address, giving prices and full particulars, A. B., care Mining and Scientific Press, San Francisco.

RICH DRIFT MINE
IN PLACER COUNTY.
Wanted, parties with capital to purchase an interest in a large rich gold mine, or to work on percentage. Address H. H., Mining and Scientific Press.

WANTED,
A Developed Copper Property.
A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.
H. B. RUNKLE, Mining Broker, El Paso, Texas.

REFRACTORY ORES WANTED.
1000 TONS or more which will assay $75 00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.
C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
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Mill Plans, Cyanide, Concentration, Smelting, Sampling.
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CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

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For Sale in Lots to Suit.
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ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
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Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

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——FOR SALE BY——
The Eureka Company,
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ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.
A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

FOR SALE.

For Sale---One 26 H. P. Hercules Gas Engine.
In first-class order. For particulars, apply by mail to JERRY J. SULLIVAN, Supt. Pioneer Gold Mining Company, Towle, Placer Co., Cal.

Group of Gold and Silver Mines for Sale.
For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

FOR SALE.
A Development Interest in a Large, Low-Grade Quarry Proposition.
Conditions favorable for working cheaply and for water power. Near good road, not far from town. Address L. M., care of Mining and Scientific Press

Hydraulic Pipe FOR SALE.
1500 feet 11-inch Casing weighing 27 lbs. to the foot, with Flanges, or Screws and Sockets; in lots to suit. Correspondence solicited.
C. J. TALLON,
308 Market Street, San Francisco, Cal.

FOR SALE.
ENGINES:
8 h. p. N. Y. Safety; 6x10 Rice Horizontal; 10x16 Hendie & Meyer; and others.
THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

A Large Hydraulic Mining Property For Sale,
Comprising 274 acres and having water rights, ditches, reservoirs, etc. Ground has averaged for thousands of cubic yards of gravel over 22 cents per cubic yard. The property is offered for sale on favorable terms, for the closing of partnership affairs, and in consequence of the death of principal owners. There are no complications; U. S. patents for title. Facilities for restraining dams good; U. S. Debris Commission rights for dams granted. Every facility given for thorough investigation. For further particulars apply to ALMARIN B. PAUL, Agent for Eastern owners, 27 Crocker Building, San Francisco.

FOR SALE.
The following Machinery:
150 H. P. Compound Ball Engine, 12-inch and 20-inch Cylinder, 18-inch Stroke, complete with Fly Wheels, Steam Pipes, Shafting, etc.
150 H. P. Heine Boiler.
7 H. P. Gasoline Hoist.
Burleigh Steam Power Duplex Air Compressor, 15-inch Steam Cylinder and 14-inch Air Cylinder, 18-inch Stroke.
Triplex Knowles Pump, operated by Electric Motor, 6½ inch Plungers, 7-inch Stroke.
8 Electric Motors and Generators, 500 volts, from 10 to 75 H. P.
5000 feet 12-pound T Rails.
For further particulars and prices, apply to
R. W. Smith,
OROVILLE, - - CALIFORNIA.

QUARTZ MILL
FOR SALE.
10-Stamp Quartz Mill.
1 Rock Breaker.
2 Ore Feeders.
1 Engine.
2 Water Wheels.
4 Frue Vanners.
6 Canvas Tables.
1 Boiler.
1 Endless Chain.
1 Electrical Plant.
Belts, Pipe, Pulleys and Bolts in profusion.
Mill been used but little. Situated on Dog creek, by wagon road six miles from Delta station, Shasta county, on California & Oregon branch of Southern Pacific Railroad. Will sell at a sacrifice, as owner has no use for it.
Address
C. C. BUSH, Agent,
Redding, - - California.

DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F.

Atlin Gold Fields,

British Columbia. Of particular interest to HYDRAULIC OPERATORS and experienced QUARTZ PROSPECTORS. American miners can pre-empt claims. For further particulars write BROWNLEE & LOWRY, Civil and Hydraulic Engineers and Land Surveyors, Atlin, British Columbia.

Michigan College of Mines.

An Engineering School with unique location, gives it unusual facilities. Distinctive methods of instruction. Special courses given. All work in charge of widely experienced men. Catalogue giving list of graduates and their occupations on application. Address **F. W. McNAIR, Pres't, Houghton, Pa.**

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HARNESS —AND— SADDLES.

CATALOGUE FREE.
L. D. Stone & Co., San Francisco, 417 and 419 Market Street.
A. KEMPKEY & F. M. GILHAM, Proprietors.

A BORE HOLE

is the cheapest, quickest, most direct, and most effective way to test lands for minerals, oil, gas, salt, sulphur, borax, water, etc.



THE STAR DRILLING MACHINES

excel for these uses. They will drill a hole through anything to any depth from 250 to 2500 feet. The only machines made that are absolutely without annoying springs. They are simple, powerful and efficient. Easy to handle at work or on the road. Used in every State and Territory and in many foreign countries.

We also make full line of drill tool-bits, reamers, sand pumps, spuds, etc., etc. Write for illustrated free catalogue.

Star Drilling Machine Co., Akron, Ohio.

For Best Satisfaction and Lowest Prices

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PERFORATED METALS

—AND—



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PLACE YOUR ORDERS WITH

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CHICAGO, ILL., U. S. A.

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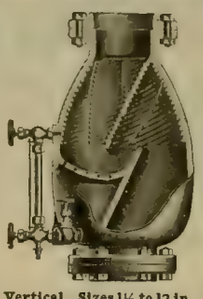
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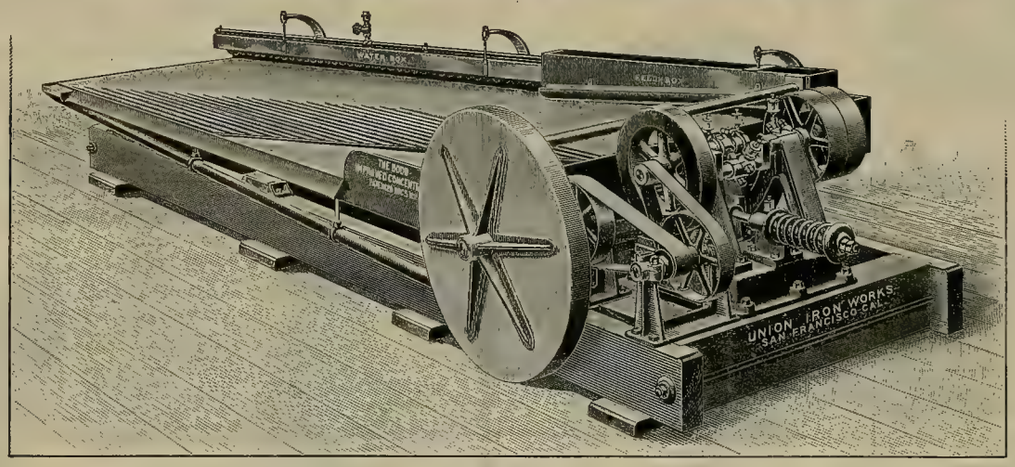
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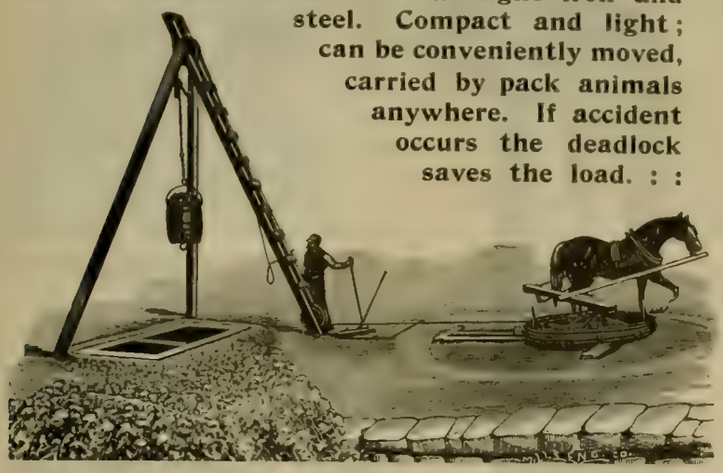
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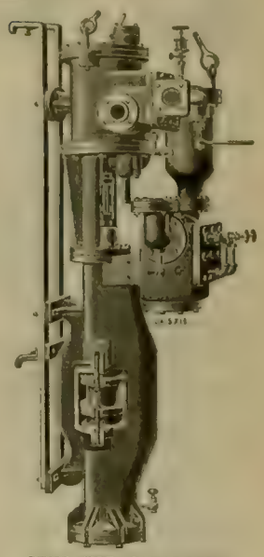
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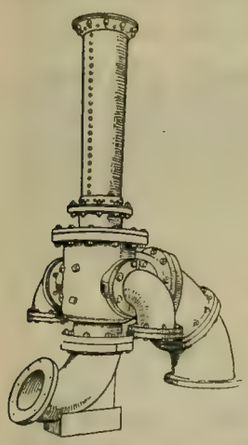
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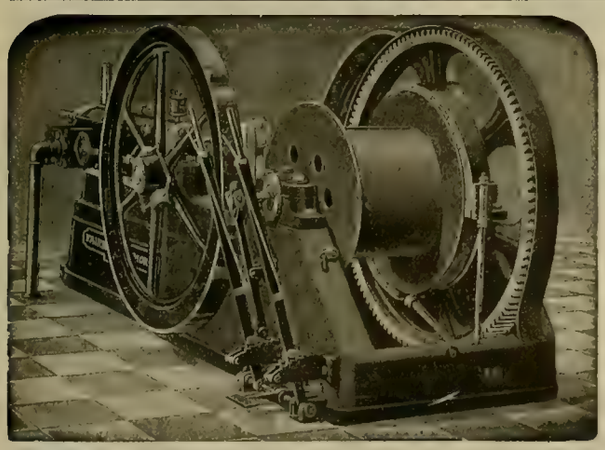
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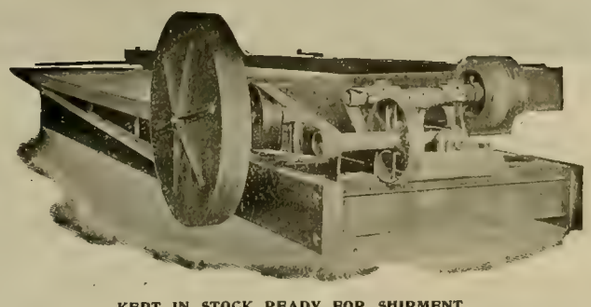
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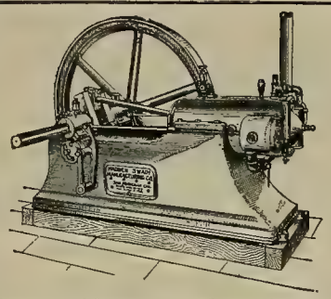
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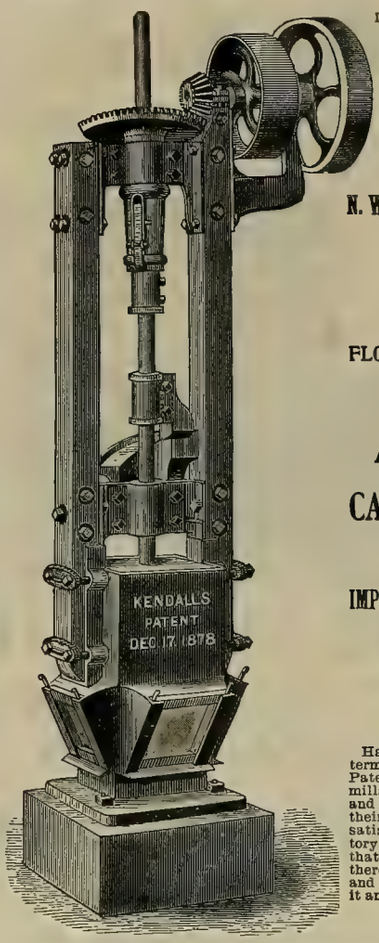
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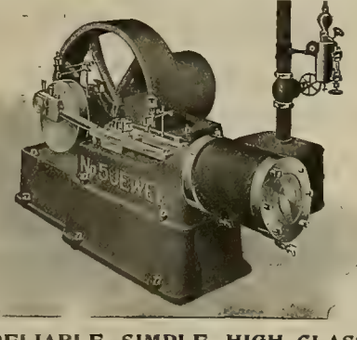
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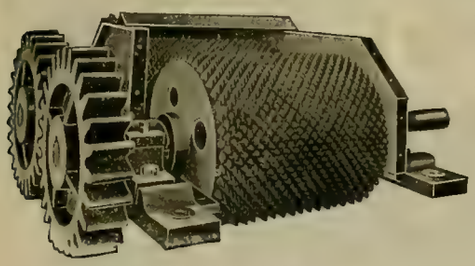
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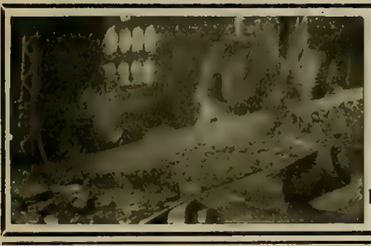


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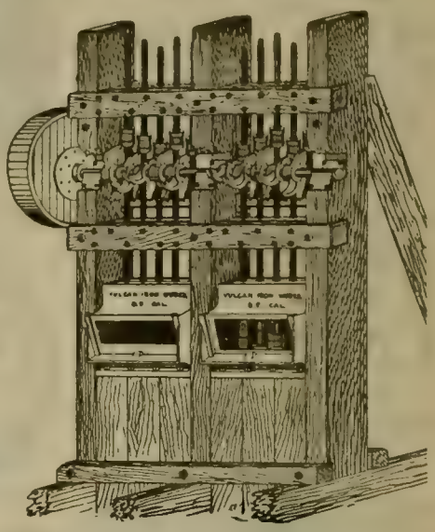
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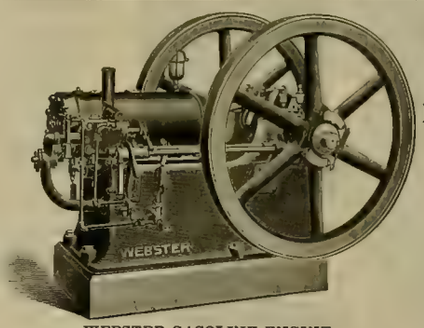
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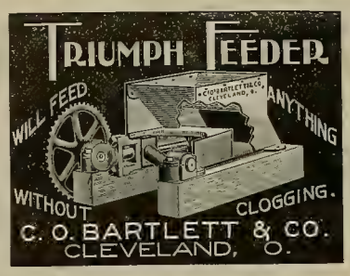


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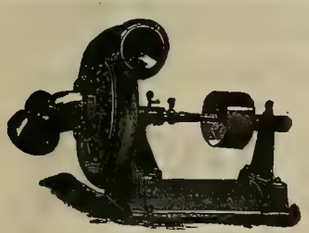
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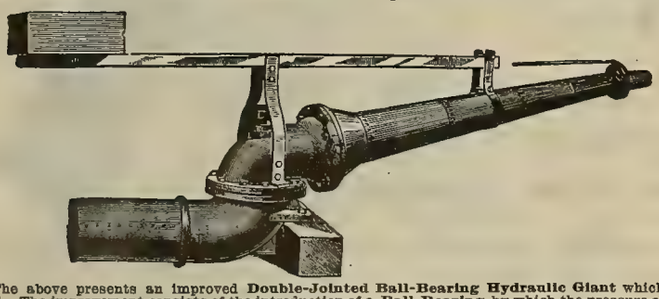
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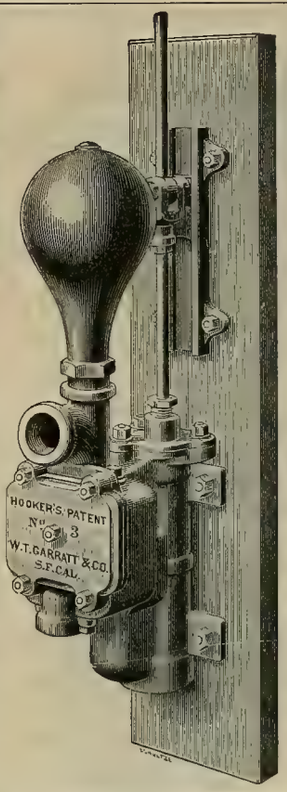
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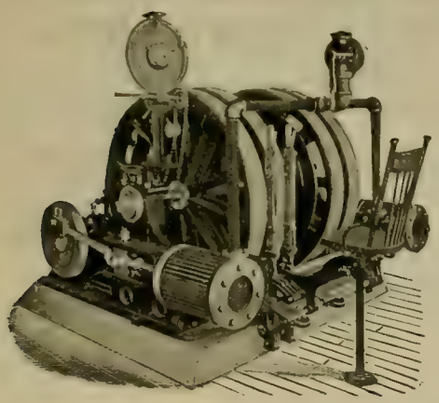
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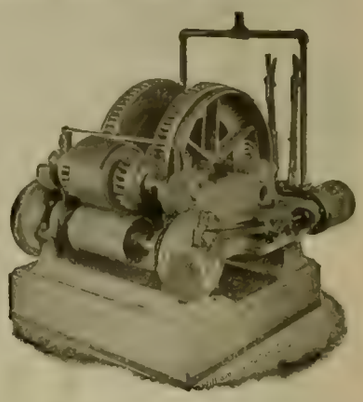
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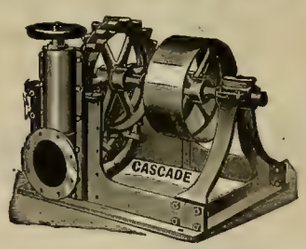
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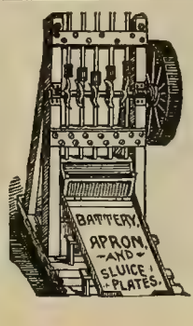
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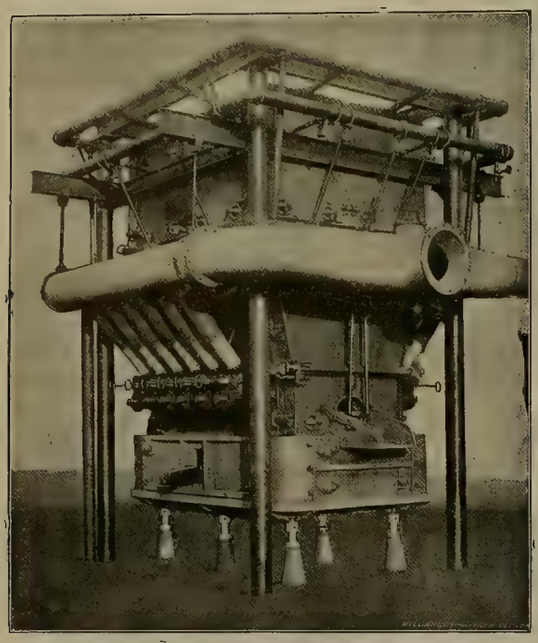
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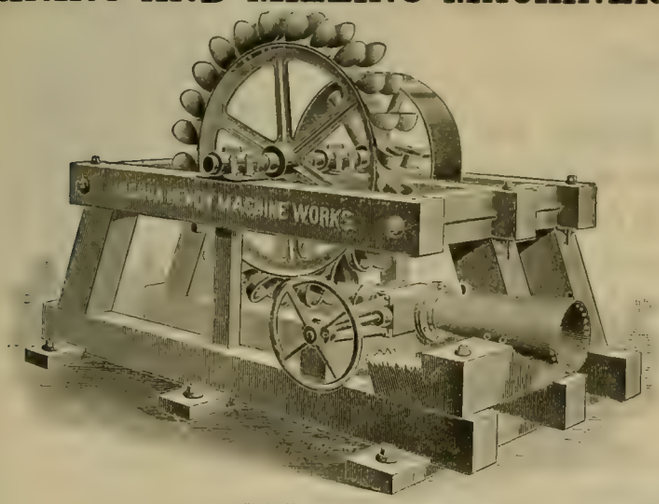
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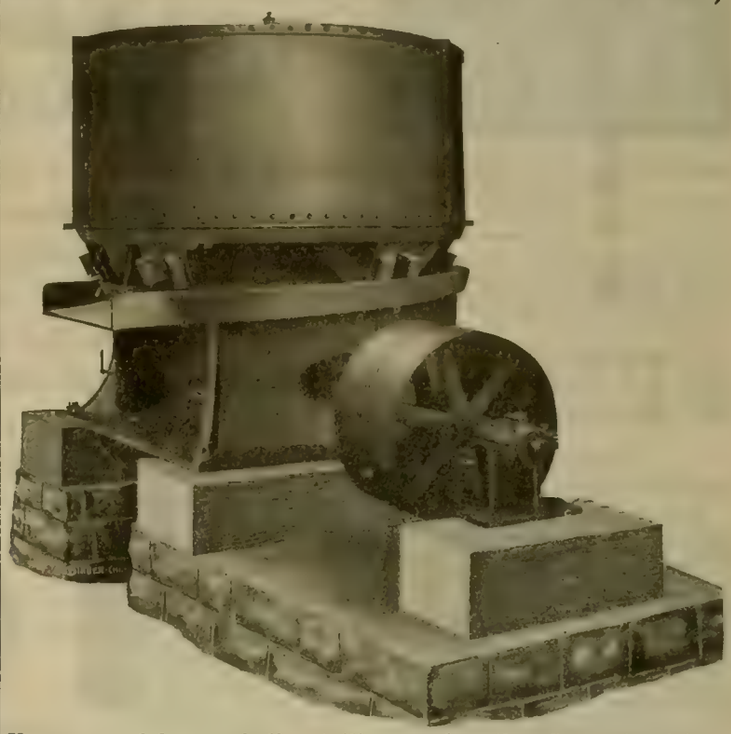
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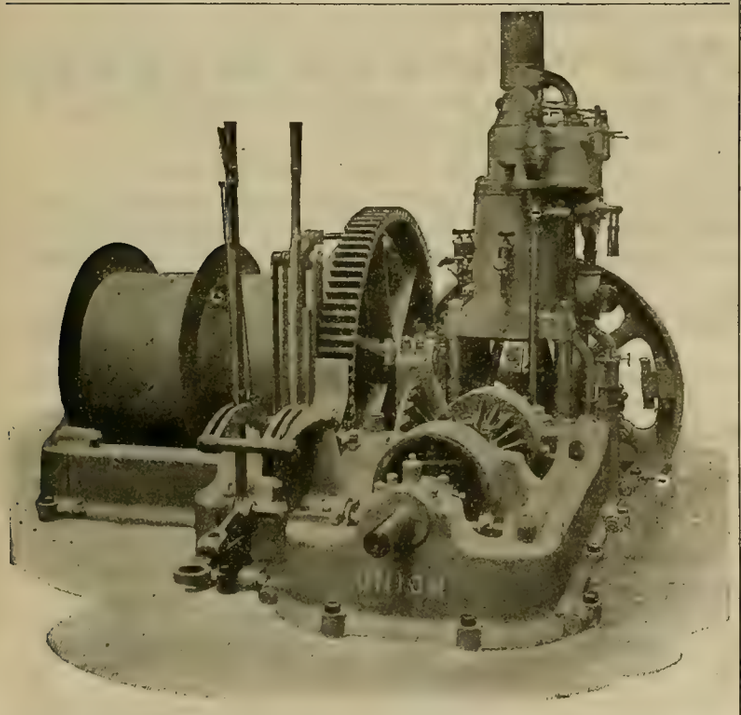
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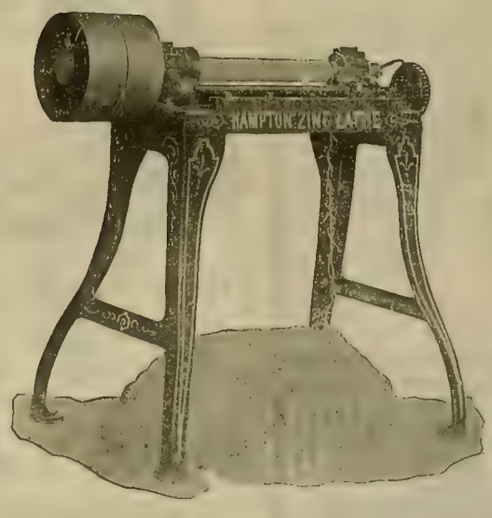
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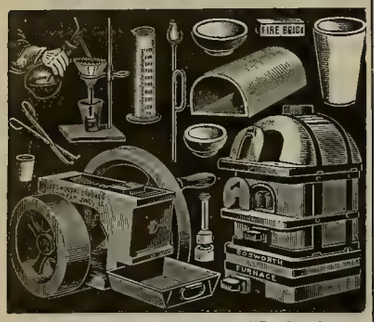
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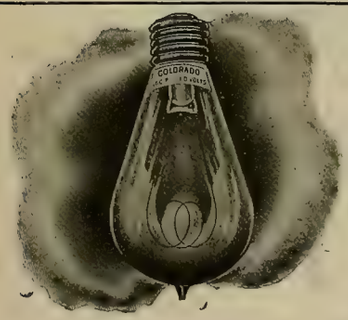
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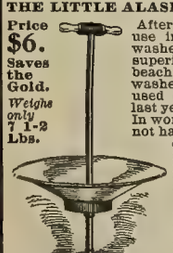
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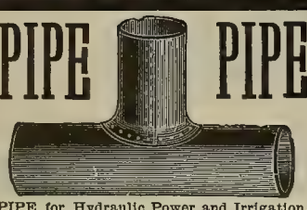


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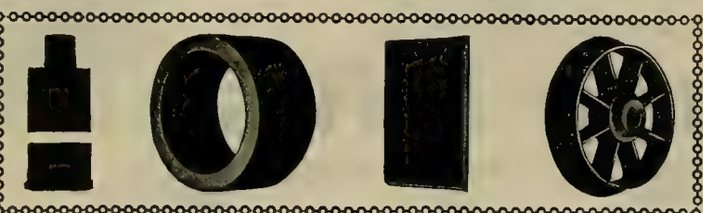
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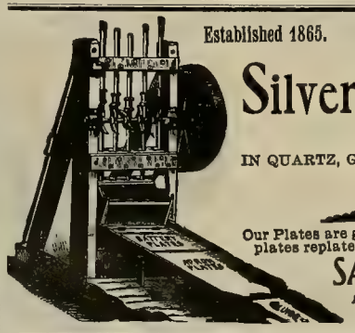
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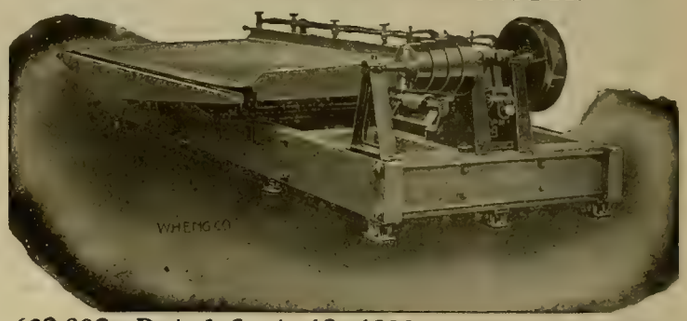
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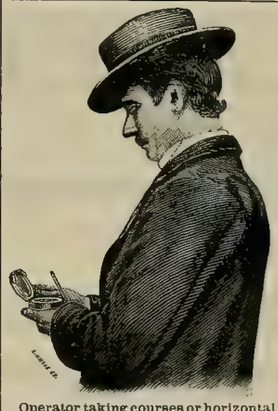
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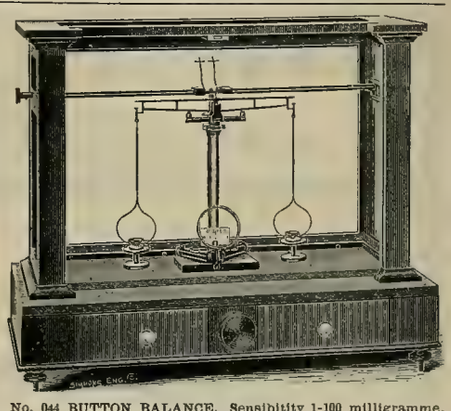
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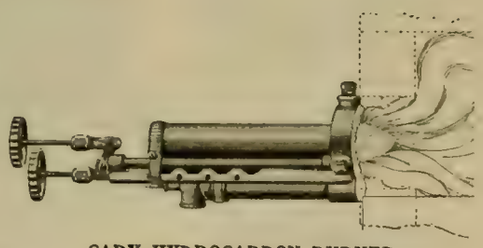


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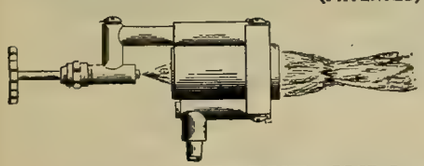
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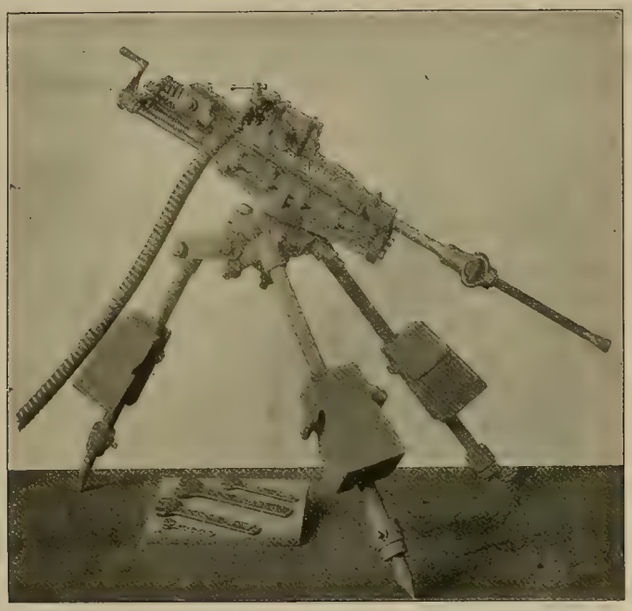
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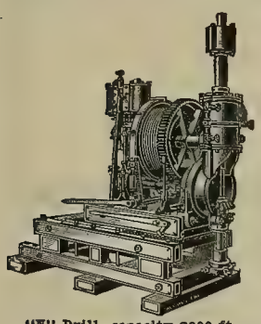
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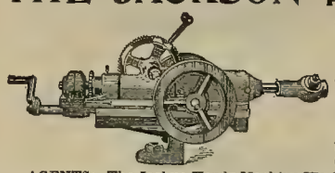
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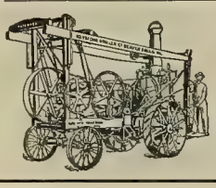


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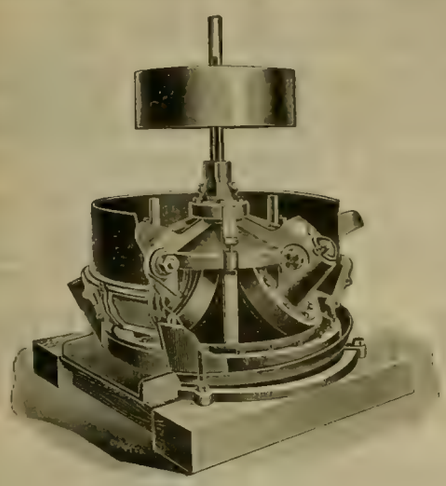


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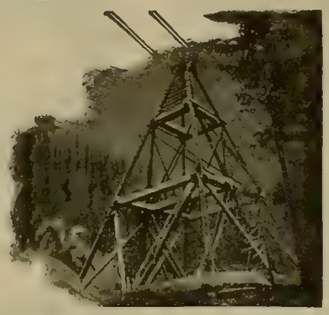
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ASSESSMENT NOTICES.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of June, 1900, an assessment of seventeen and one-half (17½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of August, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of May, 1900, an assessment (No. 25) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 21st day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of May, 1900, an assessment (No. 3) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 310 Pine street, room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of July, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 30th day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—310 Pine street, rooms 36, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of June, 1900, an assessment (No. 12) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of July, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of August, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

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630 Market Street, San Francisco.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 23) levied on the 2nd day of April, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. Heckmann, Trustee	64	2,000	$40 00
H. Heckmann, Trustee	65	2,000	40 00
H. Heckmann, Trustee	66	500	10 00
H. Heckmann, Trustee	67	500	10 00
H. Heckmann, Trustee	68	500	10 00
H. Heckmann, Trustee	70	200	4 00
H. Heckmann, Trustee	71	200	4 00
H. Heckmann, Trustee	72	200	4 00
H. Heckmann, Trustee	73	200	4 00
H. Heckmann, Trustee	79	10	20
P. A. Wagner, Trustee	90	980	19 60
William Dieffenbacker	84	190	3 80
William Dieffenbacker	98	200	4 00
William Dieffenbacker	99	200	4 00
William Dieffenbacker	100	200	4 00
William Dieffenbacker	101	200	4 00
William Dieffenbacker	102	100	2 00
William Dieffenbacker	103	100	2 00
G. A. Hinckelbein, Trustee	9	1,000	20 00
G. A. Hinckelbein, Trustee	10	1,000	20 00
G. A. Hinckelbein, Trustee	11	1,000	20 00
G. A. Hinckelbein, Trustee	24	500	10 00
G. A. Hinckelbein, Trustee	32	200	4 00

And in accordance with law, and an order from the Board of Directors, made on the 2nd day of April, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 28th day of May, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

POSTPONEMENT.

The day of sale of the above delinquent stock has been postponed to WEDNESDAY, June 27th, 1900, at the same hour and place. By order of the Board of Directors. CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

DELINQUENT SALE NOTICE.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 8th day of May, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Richard Rising	409	1,000	$100 00
W. H. Langford	628	500	50 00
Inman Sealvy	614	2,900	290 00
Reese Llewellyn	414	200	20 00

And in accordance with law, and an order from the Board of Directors, made on the 8th day of May, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 213 Jackson street, San Francisco, California, on WEDNESDAY, the 11th day of July, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. MIDDLETON, Secretary.

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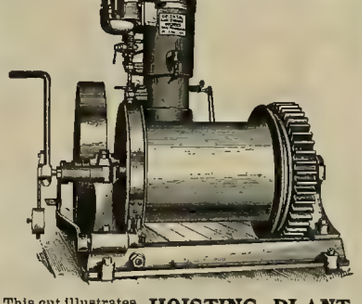
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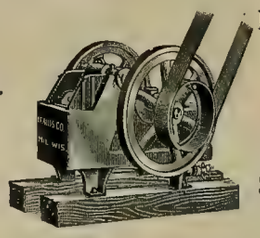
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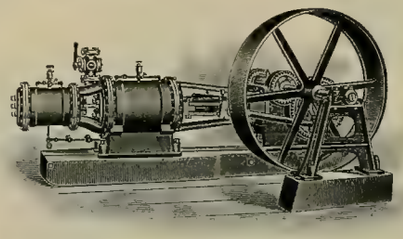
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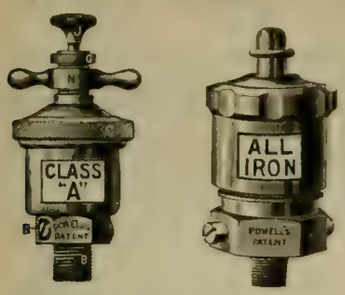
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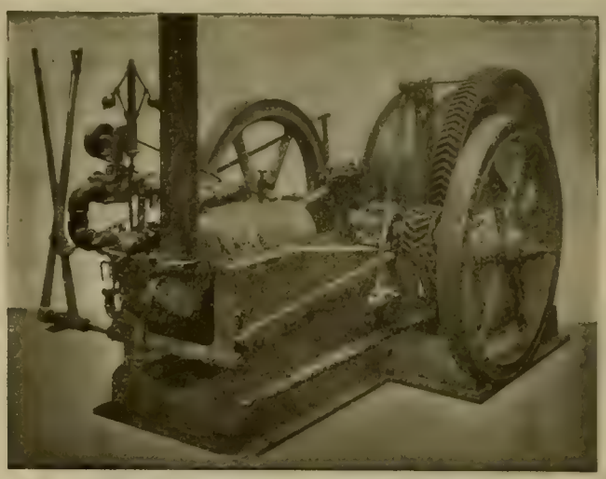
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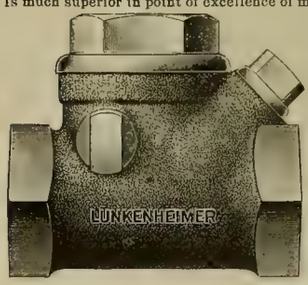
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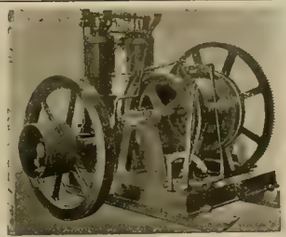


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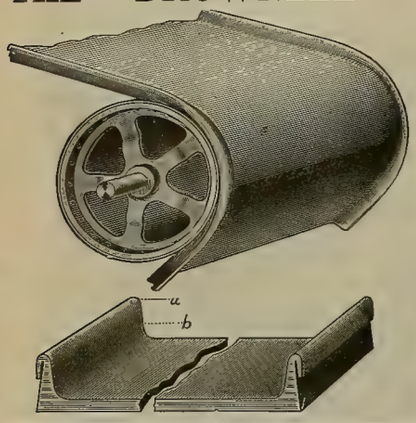
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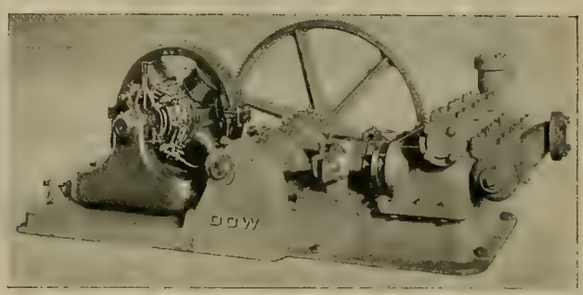
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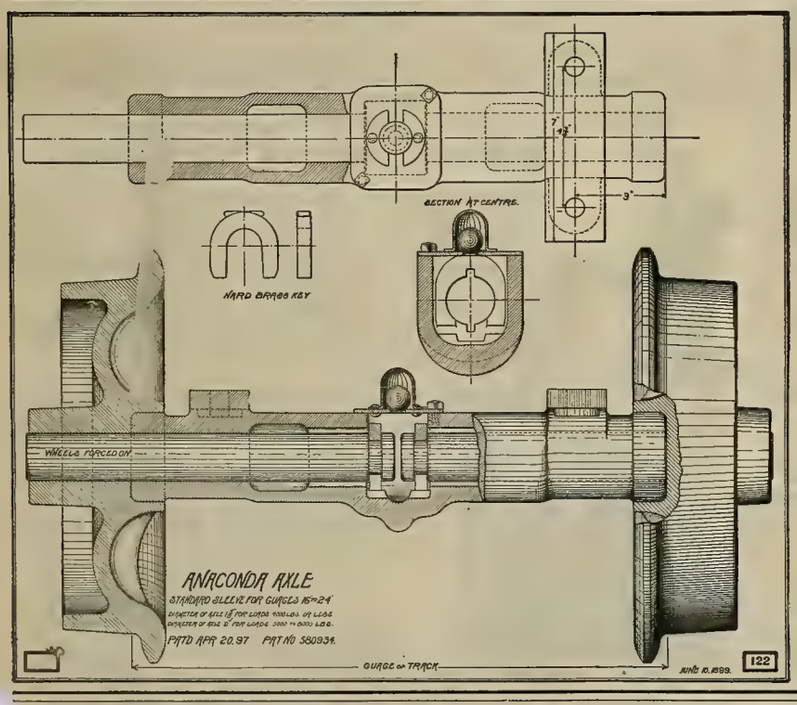
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Nitro-Glycerine and Dynamite.

Explosive nitro-glycerine was discovered by Sobrero in 1847. It is produced by slowly adding glycerine to and gently stirring it in a mixture of nitric and sulphuric acids. The resulting compound is nitro-glycerine, a cream-colored, oily fluid, insoluble in water, possessing no odor, with a sweet, pungent flavor, and very poisonous. There are various methods of manufacturing nitro-glycerine, all based upon the principle stated. In some methods apparatus of a complex nature is employed to safeguard a process constantly attended by great risk. In others the manufacture is carried on in a comparatively simple manner. Of this character is the method devised by Mr. Engels, in which the acids are placed in an iron trough, around which a stream of cold water is constantly flowing through a jacket. The glycerine runs slowly into the acid bath through two small pipes, and is nitrated by a workman pulling to and fro, in the bath, a stirrer consisting of two iron grids fixed a short distance apart on a rod carried horizontally in bearings. When the nitration of a charge has been completed, the nitro-glycerine is run into a wooden receiver containing cold water, where the acids are separated from the nitro compound, which is then well washed. Every trace of free acid has to be absolutely removed to prevent the possibility of decomposition and the chance of ultimate accident. The final washings are generally made with an alkaline solution.

The Boutmy-Faucher method of manufacturing nitro-glycerine is interesting, as it differs from all other systems. Instead of nitrating the glycerine by introducing it gradually into a bath of nitric and sulphuric acids in which it is gently agitated, Boutmy and Faucher divide their process into three stages. They first prepare a mixture of nitric and sulphuric acids, and next a mixture of sulphuric acid and glycerine. The third stage is the mixing together of the two mixtures, and thus effecting nitration. The object is to obviate the chance of accident from an undue rise of temperature, which is prevented in the process of Engels and others by surrounding the nitrating vessel with a cold water jacket. The same total amount of heat, however, is developed in the Boutmy process as in the others, but its development is distributed over several stages, at each of which the development is comparatively small, even in the actual nitrating operation.

The practical application of nitro-glycerine to blasting purposes took place in the early sixties, the late Alfred Nobel adopting it on an extensive scale in this connection in 1864. Numerous serious accidents, however, occurred, and chemists set to work to devise means for rendering this dangerous liquid safe. This was finally effected by Nobel, who, after trying various forms of silica, adopted a highly absorbent siliceous earth (technically known in Germany as "kieselguhr"), as a carrier for the nitro-glycerine. This was the original dynamite, consisting of 75% of nitro-glycerine absorbed into 25% of "kieselguhr."

There are various kinds of dynamite, but they all consist of a mixture of nitro-glycerine with substances of a more or less porous character, and which are capable not only of absorbing a very large percentage of the liquid, but of retaining it under all ordinary conditions. In some dynamites the absorbent material is also combustible, or what is known as active, the main object being to increase the power of the explosive. In the case of "kieselguhr" dynamites, however, where the carrier is incapable of increasing the disruptive force of the compound, it is classed under the head of inactive absorbents.

In making "kieselguhr" dynamite, known as dynamite No. 1, the infusorial earth, or other absorbent material, is first calcined in a reverberatory muffle furnace at a low, cherry-red heat, in order to drive off all the contained moisture and to destroy all organic matter. On removal from the furnace the "kieselguhr," or infusorial earth, is sifted and crushed to the required degree of fineness by being passed between rollers. Care is taken not to reduce it to too great a degree of fineness, lest its retentive powers be impaired, although its absorbent properties might be temporarily increased. By reducing the guhr to a greater degree of fineness than ordinary, its powers of absorption is increased by reason of the opening up of a greater number of cells or pores formed by the shells of the infusoria. But in experimenting it has been found that when too finely crushed, after standing for some twelve or fifteen hours, the nitro-glycerine has freely exuded from the "kieselguhr." The limit of its absorbent and retentive power as regards nitro-glycerine would appear to be 75%.

The nitro-glycerine and the calcined earthy matter are taken to the mixing house, where a given quantity of the absorbent material is placed in a lead-lined trough, and the requisite proportion of nitro-glycerine is poured over it. The two are then mixed together by hand, about the same as dough is mixed. Although nitro-glycerine is highly poisonous, and although absorption by the pores causes a violent headache, and sometimes acute suffering of similar character in some subjects, the workmen, as a rule, soon get over the effects of impregnation. The two ingredients having been thoroughly incorporated, the dynamite is rubbed through wire sieves to insure the even distribution of the nitro-glycerine, after which it is taken to the cartridge sheds, where it is made up into cartridges of given diameters and lengths. Two kinds of presses are used for this purpose. In one kind the quantity required for each cartridge is pressed singly into its paper casing at one stroke; these are known as intermittent machines. In the other kind of press the dynamite issues in a continuous cylindrical stream, and is cut off in suitable lengths as it leaves the machine. These are known as continuous presses. Such is dynamite No. 1, generally called "giant powder."

Turning to dynamite with active absorbents, the first on the list in the order of date is gunpowder dynamite, in which gunpowder is the active absorbent of nitro-glycerine. This is an invention of Nobel, who, in the early days of high explosives, filled cartridges of black powder with nitro-glycerine, the powder acting as the absorbent or carrier. The next step in this direction was developed simultaneously by Trauzl and Abel. In each case gun-cotton dynamite was proposed. That of Trauzl consisted of seventy-three parts of nitro-glycerine, twenty-five parts of gun cotton and two parts of charcoal. Abel's compound consisted of nitro-glycerine absorbed into gun cotton and saltpeter, and was known as glyoxiline. The dynamites so produced by Trauzl and Abel, independently of each other, were used for a time and then superseded by the gelatine dynamites.



Kellogg Peak, From Wardner, Idaho. (See page 704.)



A Bird's-eye View of Wardner, Idaho. (See page 704.)

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San Francisco, June 23, 1900.

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REFERENCE to official statements on page 707 will be sufficient answer to the numerous inquiries received, elicited by statements in daily papers, about gold mining in Siberia. As before, our advice to those contemplating unauthorized visit to Siberia is to give it up. It might result in a longer sojourn there than would be pleasant or profitable.

IN the interesting article on the 300-stamp mill at Douglas Island, Alaska, in the issue of the 16th inst., the statement was made that one reason why the mill saves so closely is that the sulphurets are distributed so evenly through the mass of ore. A further adequate cause is doubtless due to the absence of galena in the Treadwell ore. Another noticeable fact in connection with this subject is that the gold, after retorting, is worth $18.40 per ounce. In the article referred to it was stated that one-seventh of an ounce was produced every minute in the 300-stamp mill. This should have read one-ninth.

THERE is a line on the 705th page that is characteristic. In the notice of the destruction of the 50-stamp mill at the Commonwealth mine, Pearce, Ariz., last Sunday, is the fact that "the man at the hoist stuck to his post in the face of the flames." Despite the fire above and around him, he held his place and did not leave till every man was out of the mine. Nothing is needed to gild or embellish so plain and heroic an action, but the bravery of that engineer deserves due meed of applause and recognition. Such courage is characteristic of the miner everywhere.

AT Kansas City, Mo., last week a decision was given in the Federal court of some interest to mining companies and mining machinery manufacturers. Judge Corland ruled that companies engaged principally in mining are not subject to the law, inasmuch as they are "not engaged principally in manufacturing, publishing or mercantile pursuits," as a section of the law provides must be the occupation of persons, companies or corporations to be subject to bankruptcy proceedings. The decision was rendered in the case of the Victoria Zinc Mining Co. of Oronogo, Mo. The company had installed a new mill costing $72,000, the machinery contractors being preferred creditors. Other creditors attempted to force the company into bankruptcy and defeat the preferred claims of the machinery men.

Eight Hour Day in Montana.

The announcement that two of the mine operators in Montana have agreed to pay the same wages to miners for eight hours' work that they formerly got for ten hours' work will again bring to the front the same question that legislators recently attempted to decide in Colorado and British Columbia. In the American State and the British province the efforts failed, as all such efforts at sumptuary legislation always fail. The relation of employe and employer is a mutual one, and either can make and keep an agreement that could not be made or kept by such an impersonal creation as a government legislature. Just how the Montana experiment will result is not to be predicated; the inevitable tendency will be to have others follow the lead of Messrs. Clark and Heinze, for with those two paying $3.50 for eight hours' work it will be difficult for other Montana mine managers to get competent men to work ten hours for the same money. It will be noticed that this time there is no discussion of the ethics of the thing, or its fairness, or the tendency to lower wages for the skilled workman, or whether a man can and will do as much in a mine in eight hours for the same money as he would in ten. Usually some of these questions are talked about a good deal. But in the Butte case last week the men asked and the managers acceded, and that is all there is to it—so far. Meanwhile the question whether ten hours' pay for eight hours' work is as fair to the employer as eight hours' pay for ten hours' work would be to the employe is no nearer solution.

From a Montana standpoint the matter may be viewed as a political or personal one. It is probable that the idea was favorably forwarded by the two named, who employ about 800 men, to influence the amalgamated companies and the Daly management, who employ about 8000.

Some time ago the Montana miners tried to have the State Legislature pass an eight hour law. Their recent move is more feasible and gives better promise of definite result, and turn to practical account the feud between the Clark–Daly interests in that State.

ATTENTION is directed by the Scientific American to some experiments of W. Roberts–Austen, of interest to chemists and others. In 1896 he asserted that if a column of lead be placed upon a column of gold, and the two metals heated below the fusing point of lead, that the gold would evaporate to the extent of showing traces in the lower part of the leaden column in twenty-four hours. It was a theory of his then that at common temperatures as well, gold gives off vapors which would penetrate a baser body, and during the last four years he had kept such super posed metals subject to the ordinary heat of 65° Fahr., with the result, as claimed by him, that at the end of that period he has found that the gold had diffused itself in the lead, and that the amount of gold thus diffused diminished as the distance between the two columns increased. If his published conclusions are correct, while he has not proved that gold evaporates without the presence of another metal, he has shown that lead and gold may be made to mingle without applying unusual heat.

ONE of the first big electrical transmission schemes of the twentieth century in the domain of mining will be, probably, the development of the Rhodesia, South Africa, gold mines by power generated at Victoria Falls, in the Zambesi river, and brought from 350 to 500 miles. Ten years ago such a statement would have seemed absurd, but California has shown what can be done in the transmission of high voltage long distances, and of all businesses that of the gold miner can best afford to pay a high price for steady, reliable power, and if the gold be in Rhodesia the rest will work out as indicated.

REGARDING the report that the Commissioner of the General Land Office intended to withdraw the men who, as special agents, have been engaged in classifying oil lands in California, the Secretary of the Interior says, that while he may have to revoke some of the orders heretofore made withdrawing from entry and sale large sections of land in southern California, those who had gone on land and actually developed oil, or those who had entered upon the land in good faith to exploit for oil, would be given full opportunity to prove that such land is mineral.

Prices of Lead, Etc.

The American Smelting & Refining Co. report another drop in lead. Colorado reports the possible absorption of the Guggenheims by the smelter trust at the latter's figure—$35,000,000 in cash, preferred stock, and an additional bonus in common stock, thus eliminating the Guggenheim competition. There is no authentic statement as to the facts, the Colorado report being in the nature of a rumor. Regarding the proposed lead producers' association mentioned last week, it is very unlikely, as then foreshadowed, that any such organization will materialize. The compact contemplated too much contradictory to commercial dictates to stand any show of formation. Another proposition is reported to have been made by the American Smelting & Refining Co., to keep the price of lead at $4.12½ till Dec. 31, 1900, on condition that the leading lead producers agree to furnish all their continually produced ore to the trust till then, the $4.12½ to be N. Y. quotations, from which would be deducted the usual charges. Utah declares that leading lead producers of that State have signed contracts to that effect, an unlikely state of affairs which, from the producers' point of view, would be more interesting than prosperous.

A St. Louis dispatch says: "The principal owners and managers of the lead-producing mines of Missouri, Colorado, Utah and Idaho are to assemble at New York City the latter part of the week to discuss the slump in the price of lead and to discuss plans looking toward securing better prices for that product. But a few months ago lead was quoted at $4.70 per 100 pounds. Now, the price here is about $3.77. At Liverpool lead is quoted at $3.60; the duty is $1.50 and cost of transportation 10 cents. It is believed a combination of the lead producers could secure an advance in the present price of the metal, when this difference is considered."

Commenting on the above, a Washington paper says: "The seriousness of the recent slump in prices of lead to the Cœur d'Alenes is readily seen. The present lead production of the district is estimated at 80,000 tons per annum. The slump from $4.70 to $3.77 per cwt. is a drop of $18.60 per ton, or a loss to the mine owners of $1,468,000 per annum. If the price could be advanced but 1 cent per pound, it would mean a difference of $1,600,000 in their favor."

The Tribune, published at Salt Lake City, Utah, says: "The settling price that will rule this market through the week receded to $3.66½ per 100 pounds. This is the lowest figure at which the metal has ruled since December, 1898, when it advanced from $3.60 to $3.67½, and early in 1899 moved up to $3.70—the lowest price the producer was compelled to accept for it during that year."

THE International Mining Congress was in session in its third annual convention at Milwaukee, Wis., during the week, and filled the measure of conservative expectation. If it did not advance it certainly did not retard the interests under discussion. There are many manifest needs of the mining industry that can only be secured through agitation, earnest work and appeals to the intelligence and requirements of those most vitally interested. Prominent among these are revision of the Federal mining laws and creation of a national department of mining, a governmental bureau, with a Cabinet officer, whose title, "Secretary of Mines and Mining," shall indicate the scope and function of his work. Both can be secured; progress has been made, and every time public attention is directed to these subjects in any way, some advance is made toward ultimate success.

TWO PAGES in this issue are devoted to proper representation of the present condition of the work for which a State and Federal appropriation of $500,000 has been made. The novelty of the work itself and the difficulties surrounding its inception have made progress necessarily slow. It is at last in a fair way to have practical shape, and the magnitude of the interests involved make it desirous that further delay be as brief as possible.

Concentrates.

THE latest New York quotation on oxide of uranium is $4 per pound in 10-pound tins.

TO BRIGHTEN or "purify" rusty gold is not an easy task; mechanical abrasion, grinding in a pan is clumsy but efficient and is recommended.

NEXT Saturday's issue of this paper closes its 40th year, its 80th volume. A complete index for the current volume—No. 80—will be published therewith.

TO DRIVE an automobile weighing 500 pounds at a rate of 10 miles over smooth roads requires about 2 H. P. If the road is on a grade of 1%, nearly 50% more tractive force is required.

THE temperature of the cyanide solution has an appreciable effect on precipitation; many cyanidists say that at a temperature of 90° F. there are better results than when it is lower.

THE locator of a mining location in California "made now" has till Dec. 31, 1901, to do the necessary $100 worth of work or improvements. The law of 1897 was repealed by the last legislature.

THERE is no such thing as "liquid sulphur," that is, normally, any more than "liquid gold" or "liquid lead." There is a medical preparation made by boiling sulphur and lime together; but that is a different compound.

ROTARY ENGINES are patented every week; they're all right, only they don't or won't work. A water wheel is a good "rotary engine," but with steam there is constant difficulty in making satisfactory commercial result.

ONE way to tell what a boiler is doing is to find the number of pounds of water evaporated per hour: 30 pounds from feed at 100° F., evaporated into steam at 70 pounds pressure, or its equivalent under different conditions, constitute 1 H. P.

IN the recent Montana mining suit—the Colusa-Parrot vs. the Anaconda — Clarence King, N. S. Shaler and R. W. Raymond for expert testimony got each $100 per day and mileage; the others got $50 per day and mileage. They were paid $25,450.

TO GIVE iron or copper articles a fine durable brown color, make a paste of finely powdered iron oxide with alcohol. Apply with a brush uniformly, heat over an open fire, rinse and polish with a soft brush. If the desired color is not produced, repeat the operation.

A METAL POLISH in liquid form is a rare article, but the following may serve: Dissolve 15 parts of oxalic acid in 120 parts boiling water, and add 500 parts pulverized pumice stone, 7 parts oil of turpentine, 60 parts soft soap, and 65 parts of any kind of fat oil, using parts by weight.

A 3% TIN ORE could be worked at a good profit. Tasmanian tin companies find profit in concentrating a tin ore assaying 2%, the cost of mining and concentrating being about $2 per ton. So far as the writer knows, there is no present tin deposit being worked in the United States.

AN assessment of mine stock has been made in cases where treasury stock remained unsold, and the legality of such assessment has been attacked, but "Concentrates" is unable to cite any court decision on the subject, though it is believed that the assessment would stand.

SOME geologists hold that the so-called greenstones of Minnesota are the oldest known rock, representative of the original crust of the earth formed from the molten mass by the earliest consolidation. Others think the Canandian Laurentian rocks are older. The weight of evidence favors the former opinion.

BLANKETS for sluices are not specially made for that purpose. An inferior grade of Brussels carpet is about as good as anything. Where about 27 inches wide and 11½ inches on each side and 24 inches in the clear it gives satisfactory results. The ordinary grade blanket, and in some instances canvas, is used satisfactorily.

A MIXTURE of ten parts of white lead, three parts black oxide of manganese and one part litharge will stop a small leak in a steam boiler, but no dependence should be placed upon the result; that is, it may do in an emergency for a little while, but the leak itself is evidence of structural defect that needs radical treatment.

MASSICOT is an amphorous yellow powder, formed by heating lead on a flat hearth to a low red heat, removing the film of suboxide as fast as it forms, and oxidizing it to yellow oxide. If the temperature is raised to a bright red heat, and the fused oxide cools, it solidifies as crystalline litharge. Litharge is slightly soluble in water, readily so in acetic acid.

IT is figured that compared with 1870 there is in 1900 a decrease in the cost of steam power of about 38%. Of this 17% is credited to the use of multiple cylinder engines, steam jacketing, higher steam pressure and superheating the steam, 5% to vertical engines, 7% to improved boilers, 7% to economy realized in feeding the heat water, and 2% to improved construction of grates.

IN operating a siphon the lower end of the discharge arm must constantly be below the level of the water in the supply basin. When the weight of the water per square inch of sectional area in the up-tube equals the atmospheric pressure per square inch on the water in the supply basin, the siphon will cease to flow. Theoretically, the atmospheric pressure will support a column of water 34 feet high, as the weight of such a column of water 1 inch square in cross section is fifteen pounds. But, in practice the siphon will not flow satisfactorily when the top of the up-tube is more than 26 feet above the level of the water being drawn off.

BRIQUETTES said to possess heating value three times that of coal briquettes are made as follows: Petroleum, 10 liters; resin, 1 liter; soap powder, 1.5 kilos; caustic soda, 3.3 kilos; sawdust, 3 liters; these are mixed with sand by constant stirring. In about ten minutes the mass begins to solidify; if liquid be still present, soda is added. The mass thus obtained is formed into briquettes and cooled.

IT is the opinion of some cyanide experts that, so far as the chemical part of the process regarding the solution of gold by cyanide is concerned, there is not much room for further advance, and that whatever improvement is made will be largely of a mechanical nature. It is, however, generally conceded that in the matter of precipitation of gold from the cyanide solution there is yet much to learn.

TO DETECT sewer gas, wrap the suspected joint in the pipe with one layer of white muslin moistened with a solution of acetate of lead. If sewer gas escapes, the cloth will be blackened. To detect the escape of coal or illuminating gas, mix dark soap and water in the proportion of two pounds of the former to three quarts of the latter; apply the mixture to the gaspipe, when, if gas is escaping, bubbles will immediately form.

IN putting cylinder head on engine cylinder, the nuts on studs screwed up tight enough to make a steam joint, to then admit 100 pounds steam boiler pressure, would put more load on the studs and would add to the strain. Say the cylinder were 10 inches area; to admit 100 pounds would make additional strain of 1000 pounds divided among the six (or other number of) studs. Were the studs too far apart the packing would blow out.

WHERE air has been compressed to a certain pressure, and has by transmission to any reasonable distance been reduced to its normal temperature, if the air is reheated and expanded the extra volume resulting from the expansion is produced by an expenditure of heat much less than that at which the original volume was produced. With dry air two expansions are all that can be had; with reheated air it is possible to get five expansions if the air is well saturated.

GOOD boiler makers say that the best way to make a manhole is to cut the hole considerably smaller than required, and then flange it in with a straight flange on a radius not less than three times the thickness of the metal. In place of attempting to rivet on a piece of plate to make up for that cut away, it is better to make the original plate that much thicker; or the flange may be reinforced by shrinking on a reinforce ring around it, and this should always be done where the plate is one-half inch or less in thickness.

TO ASSAY cyanide liquor for gold, acidify a pint of the cyanide liquor with hydrochloric acid and heat to boiling; while in ebullition add a solution of two grains of lead acetite; then pass in a current of sulphurated hydrogen gas until all the lead is precipitated as sulphide. Allow the solution to cool sufficient to thoroughly saturate with H_2S gas, when the gold will be precipitated with and collected by the lead sulphide; the precipitation may then be filtered off and dried, and subsequently determined by the fusion method in crucibles or the scorification method of assaying.

WOOD-CUTTING TOOLS are usually made somewhat softer and with more of a spring temper than the thicker edge of metal-cutting tools. The process is the same for both, but the temper is drawn lower or to a bluish tint. For wood-cutting tools hardened in oil a slow fire should be used, so as not to burn the corners and edges by overheating. Heat to a cherry red and quickly plunge, edge first, in the oil bath. While the thick part of the tool is still hot, place it over the fire and slowly heat until the oil takes fire, then plunge again in the oil bath or water. The bluing process of tempering is much used, and is done by cleaning the surface of the hardened part of the tool with emery paper and then heating by contact with a piece of redhot iron just back of the cutting edge. When the color has reached the blue tint, plunge it in water.

GELATINE DYNAMITE occupies a position midway between dynamite and blasting gelatine. It is blasting gelatine toned down for general purposes as well as in circumstances where the latter would be too powerful. Gelatine dynamite consists of about 80% of blasting gelatine containing 5% of gun cotton, the remaining 20% being an absorbing powder composed generally of potassium or sodium nitrate mixed with wood pulp. Ammonium nitrate is used in France and Italy in place of the potassium and sodium nitrate. Rye flour is sometimes employed in place of wood pulp. There are, however, disadvantages attending the use of ammonium nitrate. Although greater effect is obtained, the dynamite becomes hygrometric and the ammonia nitrate turns acid. An article on the front page gives further data asked for.

THE specimen of emery submitted from Los Angeles county, Cal., is deficient in abrasive power, and hence of little commercial value. Emery stone possesses oxide of alumina, titanate of iron, limestone and oxides of iron. Upon the percentage of anhydrous oxide of alumina in the mineral depends its abrasive power, and in the sample sent from Los Angeles county this percentage is insufficient to make it of much value. To test the abrasive power of emery, take a small glass mortar with glass pestle; carefully and exactly weigh the pestle. Place in the mortar one gramme of fine granular emery; add three grammes water; triturate the emery with a regular pressure and motion as long as the least grittiness or bite on the glass can be felt. When it is found there is no more "bite," wash clean, thoroughly dry the pestle and again weigh it. Its loss in weight will represent the relative abrasive power of the emery under examination.

THE most recent test noted of determination of the loss of gold and zinc in smelting cyanide slimes is that furnished by R. M. Aitkin, the result of operations on material taken from the furnace chimney offal of the Boatman's cyanide plant at Reefton, N. Z. He took a sample of the incrustration formed on the furnace chimney, which was composed for the most part of brick, owing to the strong adherence of the coating of zinc oxide, which was not readily detached. The incrustation under the microscope presented the appearance of a yellowish white efflorescence, but showed no metallic gold. The sample taken weighed twenty pounds. This was crushed roughly and separated into two portions on a 30-mesh screen: pass 30-mesh screen, thirteen pounds; refuse 30-mesh screen, seven pounds. The two samples were then assayed separately with the following result: Fine sample, 8416 gr. pure gold per pound; coarse sample, 3263 gr.; the twenty-pound sample containing 5 dwt. 12½ gr. of gold. By panning the finely crusted material a yellow film or tail was seen, having the appearance of a stain or coloring. The microscope showed this to be finely divided particles of metallic gold, rich in color, of spherical form and of very even size. In this furnace a little over $5000 worth of bullion was smelted, and, as only a small portion of the fume would deposit itself upon the walls of the chimney, the loss may have been considerable. Whether the gold was carried away by the draft as fine slimes or by volitilization of the bullion, there was nothing to show. The furnace used to draw well, and had a stack of about 15 feet. In smelting, where the slimes are well oxidized and properly fluxed, the loss of zinc must be extremely small, as nearly all the zinc goes into the slag, excepting that portion reduced in the smelting, which partly enters the bullion and partly escapes as a fume. It would appear, however, from Mr. Aitkin's tests, that the portion which does not volatilize, and also the fine particles carried away by the draft, is rich in gold and worth saving.

A DYNAMO is a machine for converting mechanical energy into electrical energy. It generates an electric current when driven by mechanical power. The name "electric generator," or simply "generator," is often applied to a dynamo, especially when used to produce current for motors. An electric motor is a machine for converting electrical into mechanical energy. It produces mechanical power when supplied with an electric current. An electric motor is usually called simply a motor, and although "motor" might mean any thing producing motion, it is very rarely used in any other sense. The two machines—generator and motor—are very similar in their construction. A generator may be used as a motor if supplied with an electric current, and a motor may be used as a generator if driven by mechanical power, so that the two machines may be regarded as one, and if the construction of the motor is understood the construction of the generator is also understood. The action of both generator and motor depend entirely upon the movement of conductors in magnetic fields. The conductors are generally arranged on a rotating part, the armature, between the poles of a magnet or magnets, which is generally called the field magnet. The armature usually consists of a core of iron, on which are wound or fastened the conductors which carry the current. This core is generally made up of sheet iron. The field magnet generally consists of one or more iron or steel cores, on which are placed the field coils. Attached to these cores are the pole pieces which form the space in which the armature revolves. The output of the generator is measured in volts and amperes, the voltage being analogous to the pressure of steam in the engine cylinder, the current to the volume of steam. These two multiplied give the watts, and the watts divided by 746 give the horse power; so that, if we had a generator furnishing 250 amperes at 220 volts, we should have 250 multiplied by 220, equaling 55,000 watts, or 55 kilowatts; 55,000 divided by 746 equals practically 74 H. P. The analogy of steam or water pipes may be taken for illustrating the meaning of "loss in the line." If a certain quantity of steam is carried through 100 feet of pipe and the loss in pressure equals 2 pounds, the loss will be 4 pounds if the steam is carried 200 feet, provided the same metal pressure is kept, due to friction in the pipe. In electric currents going over wires there is a loss in exactly the same ratio; that is, if in 1000 feet with 100 amperes at 220 volts there is a loss of 10 volts, there will be a loss of 20 volts if the same current is carried through the same size wire 2000 feet. Following is a simple formula for calculating the size of a wire when the allowable loss in the line is given: Circular mils required in the conductor equals $\frac{10.8 \times L \times C}{N.}$ Where 10.8 is constant, L equals the length of wire in the circuit—that is, from the power station to the machine and return; C equals the current; N the allowable number of volts loss in the line. For example, allow a loss of 10 volts in a circuit carrying 50 amperes over a complete circuit of 2000 feet, then one would have $\frac{10.8 \times 2000 \times 50}{10} = 108{,}000$ circular mils. The nearest size wire is No. 0, which has 105,592 circular mils.

Penn Mining Co.'s Matte Smelting Plant, Campo Seco, Calaveras County, California.

Written for the MINING AND SCIENTIFIC PRESS by EDW. J. FOWLER.

This plant, located on the banks of the Mokelumne river, about 1½ miles from Campo Seco, affords excellent means of transportation to and from the mines and railroad station at Spring Valley, 6 miles distant, and has a good water supply from the river.

Unwatering the mine started in October, 1898, at shaft No. 2, on the Satellite claim, and on September 16, 1899, the smelter was blown in, the plan being to smelt the dumps and mine ore together in a small, experimental plant at first, which plant has been running on a nearly continuous scale ever since the blow-in.

Ore is hauled to the smelter after weighing and is unloaded upon a receiving platform—40x75 feet—where it is broken and sampled by the 1–10 shovel method. The 1–10 is crushed, rolled and quartered to a sample pulp in the adjacent sample room on the same level, containing one Blake crusher and one pair of Fraser & Chalmers rolls, also buckboard room and various sampling devices.

The 9–10 shovels are passed directly into stock bins—eight in number—holding about 300 tons each. These bins are 15 feet deep and open at the bottom into a charging floor at furnace feed door level.

This charging floor is 75 feet long by 12 feet wide and contains, besides the brick furnace, stock feed plates and an automatic eight-beam Fairbanks charging scales, where all charges, in wheelbarrows, are weighed before charging into the furnace.

The tapping floor, 15 feet below this floor, containing the furnace proper, slag pots, fore hearth, hot water pump and furnace tools, is covered with a suitable roof and paved with slag bricks. A matte room is also located on this floor, containing a crusher and sampling devices for handling the shipping product.

A power elevator runs from tapping floor to charging and receiving floor, where matte is weighed and stored in a suitable matte house, and from thence loaded for shipment.

Power for the electric plant is generated in one 60-inch by 16-foot Atlas tubular boiler, burning coal, and located in a room, with other machinery, 60x30 feet.

Furnace blast is derived from a direct connected couple consisting of an 11x15 Erie engine, driving a No. 5 Connersville blower. An 8x10 Nagle engine drives the line shaft supplying power for dynamo, sample room, elevator and crushers.

The plant is lighted by a 25 D Crocker–Wheeler generator, running sixty 16 C. P. incandescent lights. The entire steam system is covered with non-conducting asbestos covering.

Water is pumped direct from the river to a 10,000-gallon tank on the hilltop above the smelter and supplies smelter, mine and houses. The outfit used to handle this water is located in a pump house on the river bank, and consists of one Smith–Vaile duplex pump, automatically regulated by float and cable line from the tank, while a reserve supply of one triple electric and a power pump driven by a gasolene engine insures steady and abundant supply in case of need. The pumps work against 85 pounds pressure at the pumphouse. Hot waste water from the furnace pumped from the overflow to a small tank above the smelter is used over again through the jackets, diluting slightly with cold water. A small portion of this water, at about 150°, runs to a heater in the engine room and there is heated to 205° or 210° by exhaust steam from the engines and used as boiler supply.

The furnace is of special design, 36x36 inches at the tuyere line, intermittent tap. The matte and slag run into a large forehearth, where the matte settles by gravity and is tapped at intervals into large pots, and dumped cold.

Water-cooled furnace jackets are of steel and extend from the base to the feed floor, above which a common brick stack is built, with a downtake from it to a dust chamber on the feed floor, where the flue dust is recovered for future smelting, if desired.

The furnace stack has a door in the top, together with side ventilating hoods over the feed doors, which reduces troublesome fumes to a minimum.

The furnace blast enters at atmospheric temperature through four or six tuyeres, at the will of the operator.

The slag dump is 35 feet deep to the river bed and offords ample capacity for waste.

The assay office, tool rooms and oilhouse complete the smelter equipment.

ORES.—Three varieties of ores are available for the smelting mixture:

First—Sulphide ores from the mine, carrying copper and iron in large amounts, with gold and silver.

Second—Roasted ores from the dumps, high in silica, but carrying considerable gold, silver and copper.

Third—Carbonates, oxides and sulphides, very siliceous, from the oxidized zone of the vein.

Lime and quartz for flux are in abundance near the plant.

The general practice is first to smelt on low coke consumption the raw mine ores, mixed with the roasted dumps, all slag dumped to waste. The resulting matte is then resmelted with quartz or carbonates on lower coke and run to the desired grade of 50% or 60% copper for shipment.

The slag from this concentration is resmelted on the ore charge, and, acting as a partial flux, on account of its low fusibility, increases the ore tonnage.

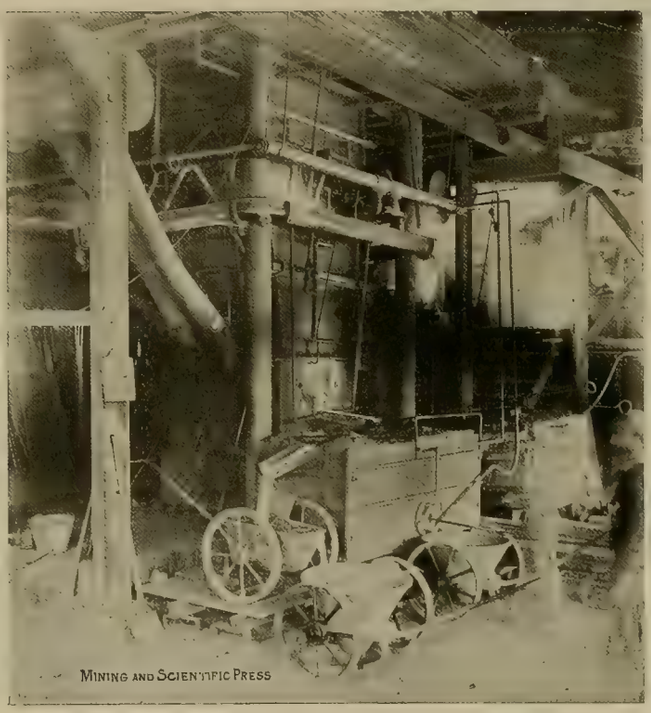
The impurities present in all the ores are confined to zinc and alumina, the former at times running very high and causing considerable trouble.

The furnace, with a hearth area of 9 square feet, averages fifty tons pay ore and eighty tons total charge per twenty-four hours.

Reconcentration is used often, as it improves the condition of the furnace by cutting out crusts, and at the same time carries much siliceous ore over and above what the regular charge will accommodate, the greater speed of reconcentration increasing the siliceous tonnage. As high as 125 tons of matte, fuel, flux and ore have been smelted in twenty-four bours on this charge.

The mine is equipped with hoist, compressor, drills and pumps, and houses are erected on the property for the convenience of the workmen.

This property is an old producer, having in years past shipped cement copper from its large roasted dumps, and, with the influx of modern methods of metal extraction, bids fair to become one of the largest copper producers of the State.



Tapping Room and Furnace, Smelter Penn M. Co., Campo Seco, Cal.



Smelter Penn M. Co., Campo Seco, Cal.

Lining Shafts With Concrete.

At Ougree in Belgium an air shaft has been sunk for a depth of 100 m., from 480 m. and 580 m., in order to examine the ground below the principal seam wrought in the district. The strata, already known from the winding shaft that had been sunk previously, were in the upper part regular and moderately stable, but lower down, while maintaining the same character, they were more disturbed, the dip ranging from 50° to 75°, and feeders of water were met with in some sandstone beds, so that the ordinary method of sinking—using provisional means of supports by timbers or iron frames, and subsequent lining with brickwork, which was followed for the first 50 m.—was not considered to be desirable for the lower part. For this another method was proposed, namely, the use of a closely fitting lining of iron channel rings, supported by iron uprights placed 1 m. and filled up with brickwork, but was found to be impracticable, owing to the high price asked for the ironwork, and, consequently, recourse was had to the use of concrete alone, in the following manner: The sinking was cut out to the full size, without any lining, to a depth of 3 or 4 m., and even more in favorable ground, and a series of four horizontal cross-timbers was laid near the bottom. Upon these was placed a cylindrical wooden frame 1 m. high, whose outer surface, 3 m. in diameter, corresponded to the size of the finished shaft, and concrete was filled and rammed into the hollow between it and the side of the excavation, a distance of 250 mm.; a new frame was then placed above the first, and so on until the bottom of the lining above was reached, the joint being made good by ramming in the last 6 inches horizontally. The cement used was made from blast furnace slag. The concrete was made with broken blast furnace slag and sandstone obtained from stone drifts in the colliery, mixed in the following proportions: Sandstone, 1100; cement, 250; broken slag, 650; 2000 kgs. giving 1 cubic meter of concrete. The resistance of such concrete to crushing is about 300 kgs. per square centimeter, while that of good bricks only averages 12 kgs., so that with less thickness a more resisting lining is obtained.

THE zinc works at Arnao, Spain, obtain 50,000 tons of coal a year from a coal mine, which extends under the Bay of Biscay. On the sea side of the shaft, working has to be carried on with precaution. The water-tightness of the submarine portion of the mine is due not only to the slowness with which the working is carried on, but also to the existence of beds of shale which fissure and swell as the sea-water filters through. The Arnao coal, from below the sea, is hard, brilliant and whitish, due to scales of calcium sulphate.

Outlines of Structural Geology.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by J. A. EDMAN.

At this point in geological history we find a series of alternating beds of sedimentary and igneous rocks, generally horizontal or slightly inclined, and frequently reaching a thickness of 20,000 feet or more, but so far not materially different from their original composition, except in the compression by gravity of the lowest strata. As, however, the crust of the earth is not absolutely rigid, but is amenable to gravity as well as to other dynamic forces, wherever a series of formations as above described attained a great depth, it would gradually subside and the lowest strata would come under the influence of the earth's internal heat and become plastic in various degrees according to composition, and in some instances semi-fluid, which would impart to some portions a certain degree of mobility. A subsidence would always be compensated for by the elevation of an adjoining already plastic section of the crust, which perhaps had been thinned by sub-aerial erosion, and ranges of hills or mountains would result near the region of subsidence, bringing to the surface formerly buried strata more or less metamorphosed by heat and pressure. By these movements of subsidence and elevation both the subsiding and rising formations would be thrown into various folds, compressed and stretched when plastic, or faulted and fissured where more rigid, and the fault planes and fissures at great depth could not remain open, but would fill as soon as formed by the most abundant and most mobile elements of the adjoining rocks, among which silica, forming on an average over 70% of the rocks of the globe, would be and practically is the most prominent. Other elements and compounds would follow, generally dissolved in the silica. Hence the origin of our fissure veins.

But here again comes in another phase of igneous action, for when the movement of the crust during subsidence was great enough to produce deep-reaching faults or fissures, these would communicate with the fusion zone of the globe and give vent to fluid rock and form dikes or pipes, either reaching to the surface, or when meeting partings between strata invading these and forming the intrusive sheets termed "laccolites." The passage of the molten matter through these dikes and pipes has frequently served to raise the temperature of adjoining rocks, and has brought about in them many chemical changes, as evidenced in our ore deposits; but it is to be noted that these dikes form the only true fissures communicating with the permanently fluid or semi-fluid zone. At depths exceeding 30,000 feet, physics teaches us that water, as such, or watery solutions, cannot exist, but will be found only in chemical combination with the rocks, or as superheated steam under enormous pressure, and it also teaches that an open space cannot long exist at such or greater depths.

The term metamorphism has been applied to the above described action by which the original sedimentary as well as the interbedded igneous rocks were subjected to heat, compression and chemical changes at great depth below the surface and excluded from meteoric influences, and the so modified and altered and generally consolidated rocks have been called metamorphic. Metamorphism must be strictly distinguished from the subsequent alterations which rocks undergo when near the surface, which is treated of in the following pages.

The foregoing sketch of geological events, while chiefly used to illustrate the building up of the Sierra Nevada and the geological ages these represented, applies also with modifications to most other regions of the globe, and all geological epochs from the Archæan to the present, for from the first "fiat" that brought forth land and water the immutable laws were fixed governing the earth, and the natural forces have been acting since then silently and wisely and without cessation, both to illustrate the wisdom of the Creator and to make the earth a perfect dwelling place for man.

There is, however, still a chapter of geologic history to be referred to, to complete the earth cycle and to present the last stage of transformation of each formation which I have above described as deeply buried and undergoing metamorphic action. This stage I shall call the "Sub-aerial," none the less important because, as a rule, geologists have not fully studied it. It refers to the changes in the rocks when elevated again to the surface, often after immeasurable periods of subsidence, and gradually brought within the influence of air and moisture.

All the strata, both unaltered and metamorphic, suffer their first change during their period of elevation from the action of the waves on a coast line when emerging from the sea, and, simultaneously, an internal modification from infiltrating water while approaching the surface, followed by a still greater alteration from the constant action of air and moisture while rising higher into hills and mountain ranges. Here the degrading and eroding forces came into play as well as the oxidizing and hydrating power of the atmosphere, by which latter even the hardest rocks are resolved into their simplest possible minerals. All soluble elements go into solution in lakes and rivers, and the insoluble parts, as sand, gravel and sediment, are transported by the same waters again to the sea, to form new sedimentary beds, to increase the solutions in the ocean and to complete the everlasting cycle.

Applying the above broadly accepted scheme of geological events as our basis, we may deduce from it some general laws bearing on the genesis of ore deposits, which, as related to the Sierra Nevada, are founded upon the accumulated experience of many observers during more than half a century in the thousands of mines of the Range. When rationally interpreted in the true light of science, these laws may be stated and arranged under three general divisions or corresponding stages in the existence of ore deposits, as follows:

First stage.—Sources of ore deposits (origin).

Second stage.—Consolidation and metamorphism (growth).

Third stage.—Oxidation and hydration (maturity and decay).

SOURCES OF ORE DEPOSITS.—The various sedimentary beds contain all the metalliferous matter of the older strata from which derived and from their associated igneous rocks, and also whatever has been precipitated from solutions in the sea water during their formation. The sea water contains gold, silver, copper, lead, zinc, cobalt, nickel, manganese and iron, besides many other elements, and these have been constantly precipitated as sulphides, arsenides, tellurides, selenides, iodides and their compounds, by carbon and organic matter suspended in the sea water and mingled with the sediments, the precipitation depending generally on the amount of carbon present.

The amount of the precious metals held in solution by the sea water is far in excess of the popular estimates.

Soustadt's and Munster's investigations on gold in sea water show its universal distribution over the globe, and the latter estimates the amount to be $\frac{1}{3}$ of a grain of gold to the ton of water. On this basis, and Geikie's estimate of 400,000,000 cubic miles as the contents of the ocean, each cubic mile would contain a value of $133,000,000 in gold, and all the sea the stupendous amount of $53,169,000,000.

Malagati and Durocher, fifty years ago, established the universal presence of silver in the sea to the extent of one centigramme to the cubic meter, equivalent, according to their estimate, to 2,000,000 tons of silver in all the oceans of the globe.

Special enrichment mechanically of a stratum may occur from metalliferous sands deposited on a coast line from rivers, from the shingle of a tidal bank and from the conglomerate forming on a coast. Chemically, an enrichment of a stratum occurs at a period of oscillation, when a deep sea bed rises into shallow water and a concentration of solution takes place, with organic matter present in abundance, as when coral banks are forming, and in still greater degree when an arm of the sea becomes land-locked and its waters concentrated by evaporation, as when saline beds are formed. Effusive lavas flowing into a shallow sea would give rise to an increase of soluble matter and a concentration of solutions, as well as cause abundant chemical precipitates of metallic and other minerals. A bed, when once deposited, while yet remaining under the sea, may be acted upon by the constituents of the water above it and of any bed superimposed upon it, as evidenced by the replacement of lime by silica in solution, by which action a limestone stratum may be changed into hornstone or quartz. In a region composed of gold-bearing rocks and in which various sedimentary deposits have formed either in the open air or along a shore line, a gradual subsidence below the sea level and the superposition of new strata upon the original surface, with subsequent metamorphism of the whole, would originate various auriferous deposits difficult to recognize or classify. Such deposits occur in California; the Witwatersrand banket in South Africa furnishes an example of partial metamorphism of an ancient shore formation, while the now accumulating bank at the mouth of the Klamath river presents a most striking instance of the modern formation of a littoral auriferous deposit.

(TO BE CONTINUED.)

Largest Oil Conduit in the World.

The first section of the largest oil pipe line in the world for the transportation of refined oil has been completed, and started April 7, 1900. The pipe line was constructed by the engineers of the Transcaucasian Russian State Railway. The pipe runs parallel to the railway track, 560 miles long. It is intended to run it the whole length of the Transcaucasian Railway from Baku to Batum, the first section completed being 145 miles. The pipe is wrought iron, lap welded, having an internal diameter of 8 inches, and was made in Russia from native materials.

The first section has three pumping stations, each station having two pumping engines, one for continuous working and the second for reserve. The pumping engines are the largest and most important which have ever been put to work in connection with the transportation of petroleum through pipe lines. There are six compound high-duty pumping engines, with condensers and compensating cylinders, each engine having steel cylinders 21 and 42 inches in diameter, plungers of 8½ inches, all having a uniform stroke of 24 inches. Each engine works against a pressure in the delivery pipe of 650 pounds to the square inch, the steam pressure being 150 pounds to the square inch. Against this heavy pressure of 650 pounds per square inch, each engine will be required to deliver 416,275,200 gallons per year, this being the quantity of oil which will be pumped through this pipe.

The Value of Topographical Surveys in Hydraulic Mining.

Written for the MINING AND SCIENTIFIC PRESS by L. H. CARVER.

The statement attributed to Napoleon that it requires three things to win battles—money, money, money—may be applied with equal aptitude to the success of mining operations. Money is indeed a potent and essential factor in successful mining, and many properties are now lying idle for want of the necessary capital to put them in proper working order; but many more are idle that, having first had a plentiful supply of money to draw upon to outfit the property, have been so grossly mismanaged that it becomes impossible to show any profit in the work ing, and the mine is shut down with the usual excuses. This is the case in too many instances, and the problem to be solved is to eliminate, as far as possible, the causes that tend to produce these disastrous results.

It is not possible to offer a solution that will apply in all cases or cover every failure, and it would obviously be preposterous to attempt it. We can, however, show that a more careful and systematic investigation at the beginning, before a large amount of money has been expended in establishing a plant, to prove the correctness of the many different theories in regard to the "pay," would materially lessen the number of failures. The preliminary showing is found to be satisfactory, and it is determined to go on with the work.

It is sometimes possible, from the configuration of the ground, to judge precisely where it can be opened to the greatest advantage, but generally it is advisable to make a complete topographical survey and map in order to spread the exact conditions of the surface clearly, accurately and comprehensively before the mind. Such a survey is not abnormally expensive, as large areas may be accurately covered in the field, with a small party, in an astonishingly short time by employing the stadia method, and the money expended for this purpose is wisely spent.

Particular attention should be given to the accurate location of all test shafts or pits, taking notes of depth to bedrock, where possible; location, elevation and dip of exposed bedrock should also be carefully noted, together with elevations, grades and courses along gulches and ravines, to establish their probable utility for dumping purposes.

The test shafts should be located systematically at regular intervals or measured distances apart, both transversely and along the course of the channel, distinguished by numbers or letters and marked on the ground, being designated on the map by corresponding numbers or letters. The different values of material, having been ascertained by careful testing at each shaft, will also be noted on the map in their respective positions.

With a complete topographical map before one, it would not be a difficult matter to lay out the work intelligently. Contour lines would show the differences of the slope as they approach each other or lay farther apart, and make it possible to read off the elevations or the difference of elevation of any points instantly. They would be convenient also in many instances to show just where the ditch line would be located and its length, in advance of actual survey and construction, and equally advantageous in selecting the best point for a dump.

Comparison could be made between the depth to bedrock in the shafts and the outcropping at the rim, with dip and the actual cross-section established in some cases. The area of the best "pay" could be as readily located and shown upon such a map, as are the shoals and channels on the hydrographic maps of the Government, and the location of the sluice-boxes could be determined to a certainty for any desired gradient that would admit the greatest possible dumping facilities.

By simple measurement from an established base, the record of the amount of work for each month could be shown and the amount of material moved accurately computed.

As it is not possible to obtain, in the first instance, a test of hydraulic propositions under actual working conditions, as in quartz mining, much care and attention is required to collect and produce such information and data in proper form, so that each step may be intelligently worked out and thus reach a combination that goes far to insure a successful result, when the true economic conditions are fully understood and appreciated.

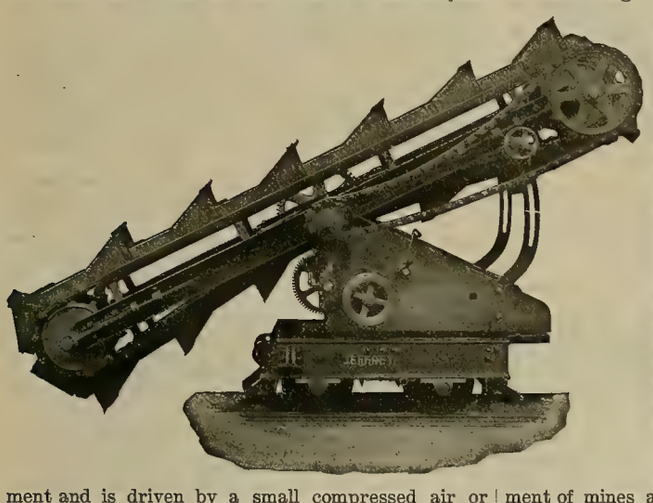
Two Years' Iron Production.

The annual report of the Iron & Steel Association gives the output of 1899, as compared with 1898, in gross tons, except coke and nails:

Articles—	1898.	1899.
Iron ore shipments from Lake Superior	14,024,673	18,251,804
Connellsville coke shipments, net tons	8,460,112	10,129,764
Pig iron, including spiegel and ferro	11,736,934	13,620,703
Spiegeleisen and ferromanganese	213,769	219,768
Bessemer steel ingots and castings	6,609,017	7,586,350
Open hearth steel ingots and castings	2,230,292	2,947,316
All kinds of steel	8,932,857	19,636,857
Structural shapes, not including plates	702,197	906,277
Plates and sheets, except nail plates	1,448,301	1,903,505
All rolled iron and steel, except rails	6,532,129	8,084,697
Bessemer steel rails	1,976,702	2,270,585
All kinds of rails	1,981,241	2,272,700
Street rails included above	143,815	154,246
Iron and steel wire rods	1,071,683	1,099,376
All rolled iron and steel, including rails	8,513,370	10,357,397
Iron and steel cut nails, in kegs	1,572,221	1,804,340
Iron and steel wire nails, in kegs	7,418,475	7,599,522

Portable Loader.

The accompanying illustration shows a portable self-contained loading machine designed for the handling of ores and similar material from the storage ground into cars. This loader consists of a substantial truck, upon which is mounted a pivoted carriage with elevator. The elevator has a vertical adjustment and is driven by a small compressed air or steam engine located upon the carriage. The buckets are arranged with open pans, which prevent spilling of the material while in operation.



The machine, of which the above is an illustration, is one that is used very successfully by one of the large ore companies in the Lake regions. The manufacturers, The Jeffrey Manufacturing Co. of Columbus, Ohio, will be pleased to give further data relative to this class of apparatus upon request.

Effect of Inclination.

From tests made by the Government Office of Road Inquiry the following table has been compiled, which shows the tractive force necessary to haul a load of one ton on roads of the best macadam on the grades given. The table also gives the equivalent length of each mile of grade in miles of level road:

Rate of inclination.	Angle with the level.	Tractive force, pounds.	Equivalent length of level road in miles.
.....	0 1 11	..	....
Level	0 00 00	38	1.00
1 in 500	0 6 53	42	1.10
1 in 100	0 34 23	58	1.52
1 in 80	0 42 58	63	1.66
1 in 60	0 57 18	71	1.87
1 in 50	1 08 16	78	2.05
1 in 40	1 25 57	88	2.30
1 in 30	1 54 37	104	2.73
1 in 25	2 17 26	118	3.10
1 in 20	2 51 21	138	3.63
1 in 15	3 48 51	171	4.50
1 in 10	5 42 58	238	6.26

THE level of Great Salt Lake, Utah, is reported to be steadily falling on account of the large volume of water tributary to it, which is now absorbed by irrigation enterprises. The Jordan and Bear rivers, City creek and other tributaries rise in the mountains to the east, and before they were intercepted by irrigation ditches poured into the lake the year round about 10,000 cubic feet a second. It is interesting to to learn that a similar condition now exists in the Dead sea, Palestine. The sea was formerly much larger than at present, as is shown by the old beaches, stretching at various levels along the basin. Since the middle of the century its level has been very slowly rising, till quite recently, but now it is falling. This shrinkage of Great Salt Lake is not due to natural causes, but to the increasing quantity of water taken from the Jordan and smaller streams by farmers, who are diverting all they can get to their lands. Some of the salt deposits covering the bottom of the lake may now be seen above the water n shallower places and near the shores.

Profits of Copper Mining.

In the following table the production of the Anaconda, Montana and Parrot companies is estimated, but in each case the estimate is based on statements of fact and deductions made by good authority:

	Product 1899, in pounds.	Dividends paid in 1899.	Profit per lb. copper.
Anaconda	121,345,398	$ 3,900,000	3½c
Calumet	88,901,133	10,000,000	11⅛c
Montana	60,000,000	5,400,000	9 c
Parrot	13,000,000	896,375	6⅞c
Quincy	14,301,182	950,000	6⅝c
United Verde	43,390,590	3,000,000	6⅞c

—Boston News Bureau.

AT Milwaukee, Wis., on the 19th, the third convention of the International Mining Congress opened with several hundred delegates present. B. F. Montgomery, of Cripple Creek, Colo., in his annual address reviewed the history of the congress up to the present session and recommended a permanent organization to meet annually. He recommended action looking to the thorough revision of the Federal mining laws to the end that mining on the Government domain should be controlled exclusively by the laws of Congress and not left to the regulation of enactments of statutes by the several States, thus producing a uniformity of method of location, size of mining claim, and annual assessment work by which a claim should be perpetuated until a patent should issue. Such legislation, he said, should be based upon the idea of inducing development of mineral wealth upon the public domain. He argued also in favor of the abolition by Congress of apex rights, or the right to follow a vein or lead on it into the land of an adjoining owner, and as a substitute for the apex rights now existing an enlargement of the location, requiring that each claim shall be circumscribed by the surface lines of said claim drawn vertically downward. He urged action to induce Congress to pass the bill to create a department of mines and mining like that of the Department of Agriculture, with a secretary, who should be a member of the President's Cabinet, and contended that the department should not be made a mere bureau to any other department, as it was now in the Department of the Interior, because then, as now, it would be treated as a matter of inferior and not of paramount importance to the country.

THE fourth annual convention of the Pacific Coast Electrical Transmission Association was held on the summit of Mt. Tamalpais, Marin county, Cal., on the 19th and 20th inst. On the first day the following named were elected as officers for the ensuing year: President, Prince Poniatowski; vice-president, Dr. Charles Van Norden; treasurer, William Angus; secretary, George P. Low; executive committee, C. P. Gilbert and E. J. de Sabla. The following named technical papers were read: "Arc Lighting for Interior and Street Service in Connection With Power Transmission Plants," H. W. Hillman; "The Choice of Alternating Current Motors," R. S. Masson; "Application of Storage Batteries to Transmission Systems," C. O. Poole; "Atmospheric Electricity With Particular Reference to Transmission Lines," Alexander G. McAdie; "Rate Indicators," Howard Hendrickson; "Factors Which Determine the Water Supply of California," Marsden Manson; "Transformers," H. C. Wirt; "Regulation Affecting Power Transmission Plants," Dr. T. A. Perrine. On the 20th was read a paper on "Transmission System Regulation," by C. E. Cory.

Natural History Collection.

The Carter collection of specimens of Rocky mountain birds and wild animals at Breckenridge, Colo., has been purchased by the Colorado Museum and Library Association, and is to form the basis of a public museum at the city park in Denver. The collection was make by Prof. Carter, a naturalist of note, and comprises hundreds of mounted specimens of birds and animals peculiar to the region named. The removal to Denver was made recently, there being six carloads of specimens. WASCOTT.

The Cost of Machine Work.

The question as to the "cost" of a machine, or of the product turned out by it, involves a number of items, at least one of which is frequently too little considered. Of course, it is well known that when a new machine is once put into service it immediately becomes "second-hand," thus entailing an immediate loss in market value. The longer the machine is in use, and the less carefully it is treated, the more rapidly it depreciates, and the extent of the depreciation, whether it be much or little, must be considered in estimating the value of the machine.

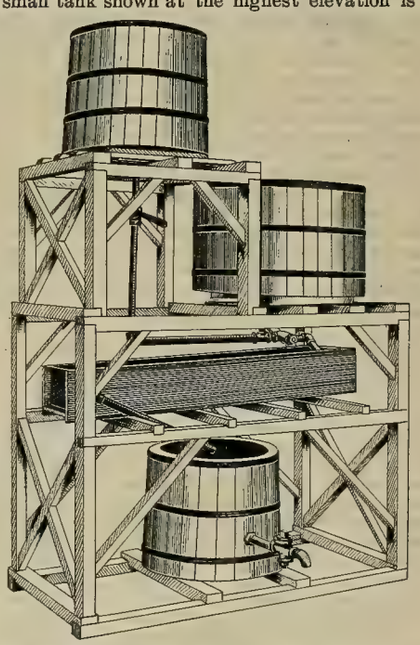
There is, however, another item which in many cases is of even greater importance. A manufacturer obtaining a new machine, especially if it is designed for some work for which there is a limited market, stands, in these days of rapid improvement and development, face to face with the question: "How long before the machine must be supplanted by a better one in order that I may compete in cost of product with others who may at some time obtain a more efficient machine for doing the same work?" In other words, what is the percentage of the hazard of being compelled to abandon the machine and procure another of later improvement in order that he may maintain his market, or may continue to make a profit on his manufactures?

Even the most casual glance at the history of special machinery, as employed in American manufactures, for example, during the past two or three decades will show that this "risk," as insurance people would term it, is by no means a small one. It is a question if the majority of standard machines can be used profitably for a period of twenty years, even if maintained in a perfectly efficient condition. Indeed, it is a question if any machines, in such a sense, are strictly standard.

A somewhat extended observation in this line leads the writer to believe that ten years is, at the present time, a high average for the life of automatic machinery generally, when considered from this point of view. Suppose, for instance, a manufacturer has the opportunity of obtaining a special machine ten years old for an extremely low price, or of obtaining a relatively high price for the latest improved machine for the same purpose, which one is the best for him to buy? Usually the latest and best will be found the cheapest. A small advance in output, quality and economy of labor more than offsets a very large difference in first cost.—Francis H. Richards in Cassier's Magazine.

Small Cyanide Plant.

The cut herewith illustrates a design for a small cyanide plant, having a capacity of 100 pounds of ore. The small tank shown at the highest elevation is to



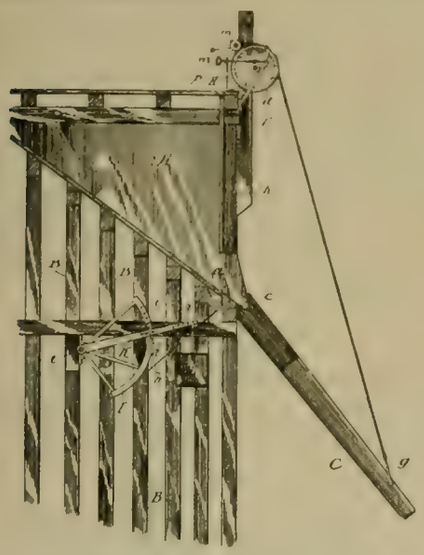
be used as solution tank, the tank just below it being intended for leaching tank and is fitted with false bottom and duck filters. The zinc box shown below the leaching tank has six compartments and is fitted with wire screens ready for use. The lower tank is the sump tank, which is provided with an outlet which facilitates the drawing off of the weakened solution to be transferred to the solution tank again where it is made up to full strength. The pipe connection between the different tanks has been studied out by the designers, John Taylor & Co., 63 First St., San Francisco, who furnish the device. There is a stop cock just below the solution tank and a similar stop cock between the outlet from the leaching tank and the zinc precipitating box. The solution enters the leaching tank through the bottom and is drawn off through the same pipe; to facilitate the discharging of the leached tailings a union connection will be found just below the leaching tank.

Mining and Metallurgical Patents.

Patents Issued June 12, 1900.

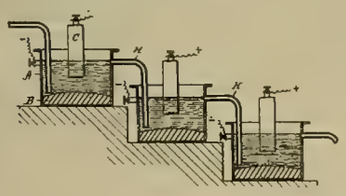
Specially Reported for the MINING AND SCIENTIFIC PRESS.

COUNTERBALANCED CHUTE.—No. 651,333; L. J. Anderson, Escanaba, Mich.



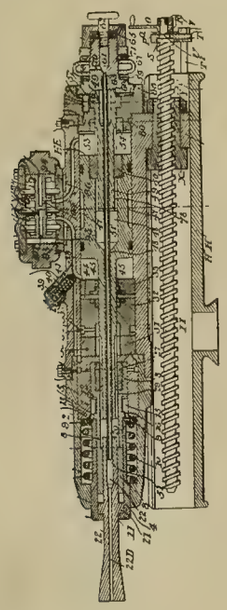
The combination of hopper bin for material provided with discharge opening at lower portion, discharge chute pivotally secured to hopper bin at discharge opening, winding shaft, primary winding drum on shaft, cable connecting primary winding drum with discharge chute at free end, second winding drum of relatively smaller diameter than primary winding drum secured to winding shaft, segmental pivoted lever having periphery eccentric with pivotal point, cable secured to second winding drum and to periphery of segmental lever, counterbalancing weight adjustable in relation to pivotal point of segmental lever, and movable support for weight on lever for adjusting weight properly to assist in raising and lowering discharge chute and counterbalancing chute by shifting position of support between weight and lever.

PRODUCTION OF CHROMIUM OXIDE.—No. 651,396; E. A. G. Street, Paris, France.



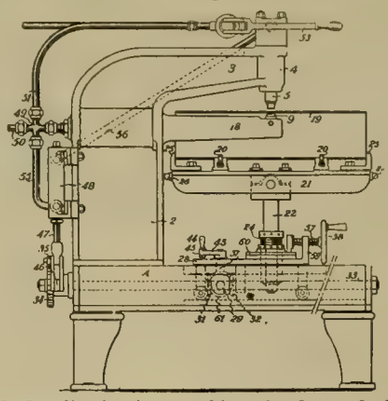
Process of manufacturing chromium hydroxide from solution of alkali metal chromate or bichromate consisting in passing electric current from suitable anode through solution to mercury cathode while temperature of solution is maintained at about 70° C.

ROCK DRILLING ENGINE.—No. 651,487; J. G. Leyner, Denver, Colo.



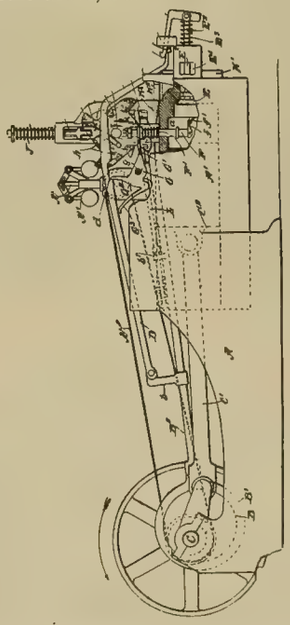
Rock drilling engine, combination with cylinder, cylinder head and piston, of drill bit arranged to be struck by piston and having lugs, shoulders or projections adjacent to shank end, drill-holding chuck containing axial bore adapted to receive shank of drill bit and lateral recesses radiating from bore adapted to receive lugs of drill bit; sleeve rotatably mounted on chuck extending beyond end of cylinder head far enough to be grasped by hand of operator, and containing flanged end extending down over end of chuck; oblong aperture in end of chuck sleeve arranged to admit shank and lugs of drill shank to pass through flange into chuck, when chuck sleeve is manually turned to bring its drill shank receiving aperture in line with chuck's drill shank receiving aperture and having chuck sleeve arranged to be partially rotated manually on chuck after drill shank is admitted to chuck to position in which drill shank receiving aperture will stand crosswise or at substantially right angles to drill shank receiving aperture of chuck, and means including stops or abutting surfaces for locking chuck sleeve's drill shank receiving aperture in its crossed or right-angled position relative to drill receiving aperture of chuck.

HYDRAULIC RIVETING MACHINE.—No. 651,503; S. Foreman, Sacramento, Cal., assignor to the Shaw, Ingram, Batcher Co., same place.



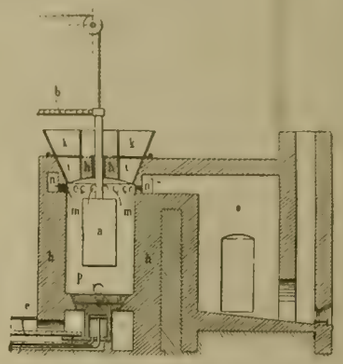
In hydraulic riveting machine, fixed mandrel and standard from which it projects and is supported, fluid pressure ram mounted upon standard and riveting tool carried thereby, second riveting heading tool mounted upon end of mandrel in opposition to that carried by the ram sleeve or socket concentric, movable with relation to interior tool, vertically moving plungers fitting in cylinders upon each side of heading tool, having upper ends adapted to support opposite sides of socket piece or sleeve, pipe or passage opening into cylinders and connecting with source of fluid pressure supply, whereby the plungers are simultaneously raised and sleeve forced above level of riveting tool, so that the plates to be riveted are first compressed together between exterior riveting head and interior yielding sleeve, and latter is afterward forced down by superior pressure of ram to allow rivet to be headed between two tools.

VALVE GEAR FOR GAS ENGINES.—No. 651,683; C. Werner, Pine Grove, Pa.



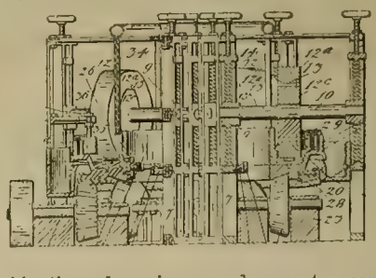
Gas or explosive engine, having separate gas and air admission valves, exhaust valve and firing pin, exhaust valve, air admission valve and firing pin being spring held in inoperative positions, main valve operating rod having reciprocative connection with engine as by an eccentric, auxiliary rod operated from main rod by tappets and operating gas admission valves, pivoted lever connected with exhaust valve to open it, star or cam wheel adapted to actuate lever and exhaust valve, toothed or ratchet wheel connected with wheel or cam and having double its number of teeth and adapted to be engaged by end of main valve operating rod to be turned thereby, pivoted firing pin operating lever having upwardly projecting arm, toothed arm or bar secured to air admission valve, rod connected with main valve operating rod adapted to be engaged by extension of exhaust valve operating lever to be raised and lowered, rod passing over firing pin operating lever having shoulder or projection adapted to engage arm thereof to operate it on outward stroke, outer end of rod dropping downward and having hook or tooth adapted to engage tooth upon arm which is secured to air admission valve.

METHOD OF ELECTRICALLY TREATING ORES OF NICKEL, ETC.—No. 651,718; H. Leleux, Paris, France.



Method of electrically treating nickel, cobalt, silver, lead and copper ores, for obtaining required metal without preliminary roasting or fusion, consisting in placing ore to be treated in contact with electrodes of metal whose heats of combination with non-metallic constituents of ore which contains metal to be liberated are higher than the heats of metal to be liberated, and then passing through electrodes and ores, electric current acting only as source of heat for bringing ore to such temperature as to cause suitably chosen metal of one of electrodes to unite, by exothermic reaction, with metals that are associated with particular metal to be liberated.

PULVERIZING MILL.—No. 651,798; J. H. Elspass, Pueblo, Colo., assignor of one-half to R. Hughes, Denver, Colo.



Combination of an inner and an outer series of posts, an annular revoluble mortar located between two series of posts, shafts journaled in spring-supported boxes mounted on posts, pulverizing rolls fast on shafts and engaging mortar, circular guide track mounted on inner series of posts, ring mounted on mortar and engaging track, ring and track being provided with interlocking flanges, annular amalgamating trough surrounding mortar and adapted to receive discharge from mortar, conical rollers engaging corresponding track formed on bottom of mortar, gear fast on bottom of mortar, and operating gear engaging mortar gear.

PRECIPITATION OF PRECIOUS METALS FROM CYANIDE SOLUTIONS.—No. 651,509; F. W. Martino and F. Stubbs, Sheffield, England.

A process for precipitation of precious metals from aqueous cyanide solutions, consisting in treating such solutions with acetylene and precipitating metals in metallic state; passing acetylene and atmospheric air through such solutions; addition of calcium carbide to aqueous cyanide solution to produce acetylene in nascent condition.

TREATMENT OF ORES AND PRECIPITATION OF PRECIOUS METALS FROM THEIR CYANIDE SOLUTIONS.—No. 651,510; F. W. Martino and F. Stubbs, Sheffield, Eng.

Process for precipitation of precious metals from their aqueous cyanide solutions, by treating such solutions with hydrocarbon gas produced when metallic carbide is decomposed by water, and capable of precipitating metals in metallic state, addition to aqueous cyanide solution of metallic carbide decomposable by water to produce hydrocarbon gas in nascent condition.

Cœur d'Alene, Idaho, Silver-Lead Mines.*

Near Wardner, the Bunker Hill & Sullivan employs about 450 men, daily extracts 750 tons of ore and runs nearly all through its concentrator—the largest silver-lead concentrating plant in the world—after carrying it 1¾ miles over an aerial tramway. A tunnel running directly under that tramway is more than half completed, and, when done, the cars into which the ore falls from the chutes in the mine will dump it directly into the bins at the mill. The tunnel will reach the ore 700 feet deeper.

Alongside the Bunker Hill & Sullivan is the Empire State-Idaho Mining & Development Co., with shipments of sixty tons of concentrates daily. Northwest 2 miles is a gulch to the O. R. & N. Cœur d'Alene branch, and from the side of that gulch a tunnel has been started to reach the ore over 700 feet below the level of the present working, the diamond drill boring to the level of the 700-foot and 300 feet farther, the vein showing better ore at that depth than has been found above. The railroad company will build a spur to the tunnel. The mining company has begun work to flume the South Fork from Wallace to the mouth of Big creek, where will be erected a large concentrating plant.

The Tiger & Poorman was recently sold to the Buffalo Hump M. Co. With a diamond drill was discovered a parallel shoot 200 feet to the south, in which 8 feet of ore has been opened up 500 feet. The diamond drill opened this shoot on every level from the 100 down to the 1300. At the same time the shaft was sunk from the 1500-foot level down to the 1600, and when the crosscut was run to the vein the ore body was found to be 16 feet wide. The superintendent estimates that it could be profitably worked down 3000 feet deeper.

In the Hecla, at Burke, the tunnel is being enlarged to permit the handling of ore in large quantities, and a concentrator at Gem is being overhauled for the company's use.

At the Black Bear & Frisco the lowest level which has been opened up is 1000 feet below the collar of the shaft, 1600 feet below the highest point where ore was mined. On that level, reached by a tunnel nearly half a mile long, before coming to the shaft, is located a pump in a station 40x60 feet, cut in solid rock, with the ability to lift 5000 gallons water each minute 1000 feet above. It cost $25,000 at the factory.

At Mullan are the Morning and Hunter. The Morning is the largest deposit of low-grade ore known in the Cœur d'Alenes, with the exception of the Bunker Hill & Sullivan. It employs nearly 400 men and handles 800 tons of ore daily. The mine and mill are connected with a narrow gauge railroad. The company is building an air compressing plant a mile below the concentrator, to be the largest plant of that kind in the district.

The Hunter resumed shipments last winter, after being closed down for a year and a half on account of its concentrator being burned. During that time, however, a shaft was started from the level of the old tunnel, and at a depth of 200 feet the ore shoot has been crosscut where it was 40 feet wide—more than double the amount it had ever shown before. With sixty-five men on the payroll, the company is mining and concentrating 200 tons of ore daily; the concentrates run 50% to 55% lead, with sixty to eighty ounces silver.

The following estimates represents the number of men employed and the shipments of ore:

Mine.	Men Employed.	Daily tons Shipped.
Bunker Hill & Sullivan	450	125
Empire State-Idaho	125	60
Government Gulch	25	10
Buffalo Hump	175	75
Standard	225	100
Mammoth	100	40
Hecla	75	30
Morning	375	110
Hunter	65	35
Sixteen to One	75	35
Frisco Con. Co	200	100
Total	1,890	720

Although one of the oldest mining districts in the Northwest, the Cœur d'Alenes are new, considered from the standpoint of development. In the early days in the silver-lead belt mining was not profitable; freight on ore was high, as were the charges of the smelters; machinery was expensive, and the concentrating of such ores was a new undertaking, and so crude were the methods that had the tailings of that day been saved they would have paid well for milling again under present methods. In 1892 came the first labor troubles of the district, and no sooner were they partially settled than there came a sudden drop in the price of silver, followed soon after by a similar decline in lead quotations. Every outlook was gloomy, and, while the mines well opened up and supplied with the necessary machinery could better afford to continue operations than to close down, at the same time there was little encouragement to the miner to open new ground, with its certainty of heavy expense and only probability of returns. Each week and month saw a further decline in the values of the product, and but that American genius kept step with this decline by the invention of new and more economical ways of mining and milling, every mine in the camp would have been compelled to close down, as some of them did.

Development work is now in progress on more claims than in the entire previous history of the camp; from those previously developed there will this year be shipped 150,000 tons of concentrates, worth over $12,000,000. The two illustrations and much of the statistical material are furnished through the courtesy of Mr. Frost, the enterprising editor of the Wardner News.

*See illustrations front page.

Explosive Compounds and Rock Blasting.

TO THE EDITOR:—The State Mining Bureau, among other publications, has issued four bulletins that have been highly appreciated by practical miners: Bulletin No. 2—"Methods of Mine Timbering," by W. H. Storms; Bulletin No. 5—"The Cyanide Process," by Dr. A. Scheidel, E. M.; Bulletin No. 6—"California Gold Mill Practices," by E. B. Preston, M. E.; Bulletin No. 9—"Mine Drainage," by Hans C. Behr, M. E. The issuance of concise and condensed information relating to any of the special branches of practical mine working is a most excellent idea, and in no other way can the State Mining Bureau be of greater service to miners than by continuing to follow the policy so happily inaugurated. That these small volumes are eagerly sought and appreciated is a well-known fact. They can be found in the office of nearly every mine, and it is a common thing to find them in the kit of the miner—the man who swings the pick and the hammer.

The best way to advance the mining industry is to prosecute mine operating along the most intelligent and approved lines, by the application of methods which, growing out of the judicious combination of scientific research and practical experience, have proven the most successful. These methods are to be found generally in standard treatises, many of them high priced and difficult to obtain, to which the ordinary miner has no access.

Now there is one department in every mine that ranks foremost in importance—that is, drilling and blasting—the breaking and extracting of the many different kinds of rock in the many different structural formations by the most advantageous methods. In this particular branch of mining there is a wide diversity of practice and belief even among so-called good miners, some of whom derive their ideas from observation and personal knowledge, while others derive theirs from tradition, popular fallacy or other erroneous source. Still others have very vague ideas, if any, of accomplishing their tasks in the manner most intelligent and effective.

It therefore seems certain that the publication by the Bureau of a bulletin devoted to "Explosive Compounds and Rock Blasting," as applied to mining, would meet a long-felt want and be appreciated not only by miners, but by superintendents and mine owners as well. It should embrace a description of the general character of explosives most commonly used and how to handle, care for and apply same, also how to locate holes in different positions to secure best results.

The preparation of such a bulletin would not of necessity involve a great amount of original effort. The bulk of the matter desired could be compiled from recognized authorities found in the libraries of the State and the University, as well as in the private collections of some mine experts, and no doubt the manufacturers of the various explosives, if asked, would cheerfully contribute much desired information.

This suggestion is advanced in this open manner in order that it may receive additional support and indorsement, which will tend to give it greater weight with the Bureau, and therefore bring about more speedy consummation. W. G. SCOTT.

Shasta, Cal.

Process of Hardening Steel.

The following is a new use of cyanide of potassium as given in the specification of a patent issued to a resident of Magdeburg, Germany:

"The piece or part of steel to be hardened is first coated with a protecting mass that is able to resist the heat, and thereafter cyanide of potassium is strewn upon that coating, whereupon the whole is put into the fire. The piece or part thus treated is then quenched. The object of the coating is to render the effect of the cyanide of potassium as uniform as possible, and I prefer to continue the application of the last-named substance after the steel, with its coating, is exposed to the fire; but instead of using only cyanide of potassium I use a mixture of this substance with coarse salt. By treating the steel in this manner I obtain in the same a very uniform structure, which is not in the least changed when the steel is cooled down. This feature is particularly important in the case of machine parts and the like.

"The coating consists generally of purified chalk and varnish; but the chalk may well be replaced by clay, oxide of zinc, and other substances that do not burn down in the fire. The oxide of zinc may be mixed with file shavings of lead, when a solid crust will be obtained, resulting from the melting of the lead.

"When the steel to be hardened, after having been coated with the protecting mass, is heated, together with this mass, the varnish, that merely forms a kind of a cementing medium, burns and a hard, porous cover remains. During the further heating of the steel with this hard, porous cover the cyanide of potassium strewn upon that cover passes into and through the pores of the latter and distributes its action uniformly upon the surface of the steel, because the pores are uniformly distributed over and through the said hard cover formed by or resulting from the protecting mass.

"When using a mixture of cyanide of potassium and coarse salt, both substances are employed in pretty equal quantities, and the quantity of the whole mixture is, of course, dependent upon the size of the pieces or parts of steel to be hardened, or of the extension of the surfaces of same, respectively."

Second-Hand Machinery.

TO THE EDITOR:—While in your editorial in the issue of June 9, concerning second-hand machinery, there is a great deal to commend we regret to see that the whole tone is against the use of second-hand machinery.

I will admit I am in this business and my views may be prejudiced to a great extent, yet the facts in the case will, I think, bear me out in what I have to say in opposition to your views.

In the first place the man who is about to buy second-hand machinery should be himself, or have at his disposal, a man capable of telling the condition of a machine upon examination. I do not say this meaning that all second-hand machinery men are disciples of Ananias, for I do not think that prevarication is any more common with them than with the original seller; but that the purchaser be satisfied in his own mind that the condition is as it is represented. The second-hand man must be a mechanic to be successful in his business; the better mechanic, the better and more prosperous business. He must be able to tell the capacity of a boiler to-day, the number of revolutions an engine should make to-morrow, the capacity of an air compressor the next, the quantity of gas produced by a gas producer, and so on throughout all his stock. He must be able to tell this from facts and experience, if he is a success in his line. It is not the same story with him every day that it is with the man who has one special line and learned his story well. We are all liable to be mistaken, and if you satisfy yourself as to the capabilities of the article in question you are bound to be right.

While, perhaps, in many shops there are articles of machinery that could be well put in a collection of antiques, yet I think that 90% of the machinery in second-hand stores is modern. Whatever there is a demand for is that which the second-hand man is more eager to buy. The time when a thing was bought because it was "cheap" has gone by, as the up-to-date man has found that modern machinery and supplies are the sellers, not the cheap things of times gone by. Look back for a few years and see for yourself the failures which have been made in the mining industry and you can realize the possibilities of placing modern material in your warerooms. Where single machines were bought years ago, you will find the second-hand man looking for and purchasing entire plants which for some cause have been forced to close their works.

If a manager can find the machine he is looking for and satisfy himself as to the condition of it, I claim that it is economy, and I mean it in the same term you use it in your editorial. The day when "cheap" was the criterion of dealers is gone, and now it is "how modern, how good, how long used."

The most erroneous idea in connection with the second-hand business is that the poor man, the man with small capital, is the mainstay of the business. Such is furthest from the actual fact. In New York City, last month, was placed an order for over $20,000 worth of second-hand material and machinery by the largest smelting and mining company operating in North America. The largest buyers of second-hand material in Colorado are the largest and wealthiest mines in the State. Take, for instance, second-hand pipe. Dealers do not claim that the life of it is as long as new, but the question is, Is it not long enough to outlive the life of the drift or stope where used? It would be as reasonable to say that it was not economy to take out pipe from one drift and place it again in another, as to say that new pipe would be cheaper to use than second-hand.

In conclusion I would say, do not discourage the purchase of second-hand machinery, but rather urge careful and well-inspected purchases in this line. A machine that cost $1500 when new and is offered at $100 shows on the face that there is something the matter with it. A good second-hand article has a value as well as a new one, and the price is the dealer's judgment as to its condition. Yours very truly,

GEO. G. MORSE, Pres. The S. H. Supply Co.

Denver, Colo., June 13.

MINING SUMMARY.

ALASKA.

(Special Correspondence).—The Yakima mine lies about a mile back of the southern end of the Treadwell system of mines on Douglas Island, at an elevation of 600 feet. At this elevation there is quite a flat well timbered, and at the upper end of the flat is the mine hoist and shaft, and towering far above to the westward the timber clings to the mountain sides, and then above the timber line the bold mountain tops of the center range of the island appear partially covered with snow. The mine is a consolidation of several claims and is operated by the More Investment Co. of Seattle. It is claimed that the ore body is 600 feet wide, runs nearly east and west and dips to the north at an angle of 70°; the bedrock is slate. There is a nice hoisting plant with an air compressor to run a machine drill. The shaft is sunk to a perpendicular depth of 170 feet. At this depth a crosscut is being run in the ore body and is nearly 300 feet in length; it is to be run till the hanging wall is reached. Some of the quartz on the dump is heavily sulphuretted and carries lead, a metal which is not found in the Treadwell ore.

Douglas Island, June 10.

The Cape Nome Gold Digger of the 30th ult. says that at Topkok there are forty tents, one saloon and 120 men. They took out some big money down there, but the claims are played out now. A big strike is reported 20 miles below Topkok and the miners are stampeding there now. W. W. Cardwell in that part of the coast worked two hours on the beach and reports that he saw a miner clean up $1100, and also that the men brought to camp sacks containing 2500 ounces of gold, worth $40,000. He says that three men took out $100,000 from a piece of ground 60x100 feet in size. Each claim was 20 feet wide, but the whole "shooting match" was only 300 feet long and is now substantially worked out. The beach there has produced in the last few weeks from $300,000 to $400,000.

The A. C. Co. has secured the big black bluff near the beach workings. It is said to be full of gold.

Three hundred men are at Bluff City and in the vicinity, poorly equipped with tools and supplies.

With the rich ground there is, of course, much that is poor. Some men, other than the lucky ones alluded to, make $10 or $12 a day, and others are unable to make more than $4, $3 or $2.

Over 500 men left Nome during the last week or ten days to work in various places—Anvil, Glacier, Snow and Dexter creeks. Others have struck out for Penny and Cripple rivers, the Kougrok and elsewhere to prospect, some on creeks and others along the ocean shore. Topkok and Bluff City have taken away a good many, while others have gone to the Golovin and Denbigh districts.

The mines of Anvil, Snow and other creeks are making a steady output of gold. Sluicing is going forward right along.

From now on to July 10 the vessels will have a hard time of it getting through the ice. The ice from Norton sound is gradually being blown out and is breaking up, and the vessels, instead of having a clear passage, will be compelled to cut their way through the floe.

The Alaska civil code bill has been signed by the President. The provisions of the law covering mines and mining claims located on the beach of Bering sea are as follows:

Section 26. The laws of the United States relating to mining claims, mineral locations, and rights incident thereto are hereby extended to the district of Alaska: Provided that, subject only to such general limitations as may be necessary to exempt navigation from artificial obstructions, all land and shoal water between low and mean high tide on the shores, bays and inlets of Bering sea, within the jurisdiction of the United States, shall be subject to exploration and mining for gold and other precious metals by citizens of the United States, or persons who have legally declared their intention to become such, under such reasonable rules and regulations as the miners in organized mining districts may have heretofore made or may hereafter make governing the temporary possession thereof for exploration and mining purposes until otherwise provided by law: Provided, further, that the rules and regulations established by the miners shall not be in conflict with the mining laws of the United States; and no exclusive permit shall be granted by the Secretary of War authorizing any person or persons, corporation or company to excavate or mine under any of said waters below low tide, and if such exclusive permit has been granted it is hereby revoked and declared null and void; but citizens of the United States or persons who have legally declared their intention to become such shall have the right to dredge and mine for gold and other precious metals in said waters below low tide, subject to such general rules and regulations as the Secretary of War may prescribe for the preservation of order and the protection of the interests of commerce. Such rules and regulations shall not, however, deprive miners on the beach of the right hereby given to dump tailings into or pump from the sea opposite their claims, except where such dumping would actually obstruct navigation; and the reservation of a roadway 60 feet wide, under the tenth section of the Act of May fourteenth, eighteen hundred and ninety-eight, entitled "An Act extending the homestead laws and providing for right of way for railroads in the district of Alaska, and for other purposes" shall not apply to mineral lands or townsites.

ARIZONA.

COCHISE COUNTY.

The South Bisbee is to be developed on a larger scale. A contract is let for a shaft 600 feet deep, one-quarter of a mile from the South Bisbee hoist. The formation of the South Bisbee mine is changing with development from lime-rock hardness to a broken formation containing clay and black manganese.

Fire destroyed part of Pearce on the 17th. Oil was being used instead of coal for fuel. The tanks where the oil was stored became ignited and exploded, scattering fire. The Commonwealth mine buildings were nearly wiped out. At the shaft house the man at the hoist stuck to his post in spite of the flames. The fire reached him as the last man came out. A 50-stamp mill is a total wreck; loss, $100,000. Cessation of work is but temporary, as the mill will be immediately rebuilt.

GRAHAM COUNTY.

A report on the Shannon mine near Clifton recommends an increase in the capitalization and sale of treasury stock, enabling the company to put in machinery.

MOJAVE COUNTY.

In the main shaft of the Silver Age, at Chloride, the vein is large; besides gold, silver and lead the ore carries 8% copper.

Near Chloride the Elkhart mine and 100-ton concentrator have started up. Thirty men are employed.

Manager Timmons of the Payroll mine has let a contract for 300 feet of crosscutting and drifting at the bottom of the 250-foot shaft.

PIMA COUNTY.

(Special Correspondence).—The Darius Green M. Co. is organized here; P. W. Fleming, secretary and treasurer. The company has placer claims in Pima and Santa Cruz counties and has patents on a new machine for extracting gold by the dry washing process.

Tucson, June 18.

PINAL COUNTY.

The Florence Blade says that seventeen tons of ore shipped from the Golden Quiver mine at Mineral Hill last week averaged at the smelter 52% lead.

YAVAPAI COUNTY.

At the Copper Chief, formerly known as the Equator, men are opening up the mine. Supt. Hendry has had experiments made of the cyanide process on the Copper Chief ore. It is locally reported a large cyanide plant has been ordered.

The Val Verde Smelter Co. is preparing to put in a pyritic smelter for treatment of siliceous ores. A dynamo will be put in to electric light the works.

CALIFORNIA.

AMADOR COUNTY.

The North Plymouth M. Co. has incorporated; capital stock $300,000, subscribed $7000; F. W. Voogt, J. Toman, J. K. Keeney, J. H. Spring, R. L. Cheney, S. Rosenheim, A. A. Frank, E. L. Wemple.

Democrat: Near Volcano, in three of the gravel mines the commuters are making $5 to $37 per day to the man. Recently in one of these a candle box of gravel yielded $45 and several pieces ranging in value from $5 to $25 were found.

Jackson Dispatch: H. Smith of London, England, managing director of the Exploration Co., Ltd., and F. W. Bradley, who has been appointed to succeed the late Capt. T. Mein in the management of the company's interests on the Pacific coast, have been examining the Oneida and are well pleased with the progress being made by Supt. Truscott. The framework of the new 60-stamp mill is up and the mortar blocks in place. At the old shaft the water has been lowered to the 1200-foot level. In the new shaft the upraise from the 2000-foot level has been completed through to the 1700-foot level. When this is completed there will be a continuous upraise from the 2000 to the 1500-foot level

BUTTE COUNTY.

A. B. Chambers will put a new quartz mill on Bloomer hill. He has a flume and ditch 11 miles in length to carry the water of Berry creek to the mine.

CALAVERAS COUNTY.

At West Point the Lone Star mine is to be sunk 300 feet deeper.

The Josephine mine is being worked.

Messrs. B. and L. Williams, formerly of the Copper Queen, Bisbee, Arizona, assisted by their old-time foreman, J. Ambrose, are unwatering the old Napoleon mine near Milton, four miles south of Copperopolis, and will reopen this old property. The Napoleon discovery was, practically, the first showing of copper in California. It was located in November, 1860, and at the time occasioned great excitement. In October, 1862, it was incorporated, each foot of the 2700 feet representing a share of stock and selling at $100 each. The Napoleon began shipping ore in May, 1863. The old books of the company show that in 1863 the mine shipped 1,172,165 pounds first class and 1,507,621 pounds second class ore. In September, 1864, it began shipping "concentrates" crude, after the manner of the day, the "concentrates" being thus prepared: A pit about 2 feet deep was cut in the soft soil, about 20 feet square, in which was laid four cords dry pine wood; over this was piled in a truncated cone 100 tons ore; the wood was fired and the mass burned for about six weeks, when the sulphur had well burned out: thus the ore was "concentrated." No ore going below 10% was shipped; all above 15% was "first class ore," from 10% to 15% second class.

The old workings, idle since 1865, will be unwatered by Messrs. Williams, and then a modern compartment shaft will be sunk. About $50,000 will be spent in putting this old property in shape to begin paying dividends again.

EL DORADO COUNTY.

Judge Bahrs of San Francisco will have work at the Little Gem mine, near Volcanoville, resumed.

J. F. Jones and W. G. Roberts have bought the Epps placer mine near Garden valley and bonded the Hart quartz mine adjoining. They are driving a tunnel that will tap the ledge. The Nugget says they intend to build a 20-stamp mill.

Nugget: In the Larkin mine, Diamond district, good ore is reported on the 400 and 600-foot levels. The 10-stamp mill is running night and day.——Work has resumed on the Griffith Con.——At the Ribbon Rock, Diamond district, E. A. Davis Supt., the shaft is down 200 feet.——The Boulder mine, on Webber creek, is working twenty-four men. The 20-stamp mill is running continuously.——Hill Bros. & Galt of this county are installing a three-drill air compressor at the Buena Vista mine, on Mathenas creek.——Eighty-five men are employed at the Blue Ravine gravel mine, near Mormon island.

KERN COUNTY.

Randsburg Miner: At the Searles Borax Works, D. Searles was given the option of running the works on his own hook, with the combine against him, or take a salary of $500 per month and stop; he chose the latter.

Bakersfield Californian: A 4½-inch pipe line is discharging a stream of oil at the Central Point and Section Four companies properties. They have a joint line from their wells to a tank three-quarters of a mile away. These two companies are producing 200 barrels per day.——On Jan. 1, 1900, any amount of land could be bought in the Kern river district at $250 per acre. Now $1000 is deemed a low price and the figure is nearing $1500.——The capacity of the refinery at Sunset is to be doubled. The plant now on the ground represents an investment of $25,000.

MADERA COUNTY.

(Special Correspondence). — The Lily mine has resumed work. One thousand cords of wood are being cut for the Waterloo mine. Ore is being hauled from the Standard mine to the mill. The Magnet Co. has begun the construction of its system of reservoirs at the head of Crystal falls.

Gold, June 20.

MARIPOSA COUNTY.

The Austin mill at Whitlock has begun crushing rock for Johns Bros.

NEVADA COUNTY.

C. W. Bonnemort, former Supt. Sierra Nevada mine, will reopen the Culbertson mine at Graniteville.

The Spanish Con. Q. M. Co. has levied an assessment of 5 cents per share, delinquent July 16th.

At Grass Valley the Mountaineer quartz mine was shut down this week, forty employes being laid off.

RIVERSIDE COUNTY.

D. T. Ulmer reports having found and filed twenty-two claims, each 600x1500 feet, 60 miles northeast of Salton.

SHASTA COUNTY.

The meeting of the Little Tiger M. Co. will be held at Charleston, West Virginia, June 26th.

The Gladstone gold mine at French Gulch is reported sold to J. H. Roberts, L. A. McIntosh and I. O. Jillson by J. H. Wolkotte. The development of the mine has been carried to a depth of 900 feet; there are 7000 feet of track in its tunnels.

SIERRA COUNTY

A quartz mill goes to the Osceola mine at Alleghany for a Los Angeles company.

SISKIYOU COUNTY.

At Redding the Scott Mountain M. Co. has incorporated; capital $500,000, $70,000 subscribed: F. P. Primm, J. W. Conant, T. B. Smith, J. J. Chambers, E. S. Watson; to work on Scott mountain, near the Shasta line.

TUOLUMNE COUNTY.

Near Sonora, at the Mazeppa, the shaft has been sunk 515 feet, at an average cost per foot of $19.65: 1134 feet of drifting, crosscutting and upraising has cost $8.25 per foot.

News Bureau: Treasurer Belches is still receiving the certificates of the Santa Ysabel G. M. Co. stock and the $1 installment on the same. About 115,000 shares have thus far been surrendered out of the total 130,000 share capital.

COLORADO.

BOULDER COUNTY.

At Ward, the B. & M. Co.'s new pump will allow shaft sinking from the 800-foot level to 1000 feet and more. Secretary Helbig says: "There has been expended $16,973.24 for general improvement and development work from January 1 to June 1, 1900, and shipments of ore have been suspended in order to sink the shaft on the mine from the 600 to the 800-foot level, run these levels into the ore bodies below and take out the old bucket way so as to remodel the entire shaft and operate a skip, which will more than treble the working capacity of the mine. This work will be completed by July, when shipments of ore will be resumed."

At Ward, G. E. Brinker is managing the Old Colorado property and is unwatering the shaft.

CLEAR CREEK COUNTY.

The Little Richard G. M. Co., at Idaho Springs, has its shaft 562 feet deep and proposes to utilize the water in Soda creek for lighting the mine workings and operating an electric hoist. G. W. Morgan is manager.

The Atlantic mine on Silver mountain and the company's mill on Clear creek will resume under the management of Mrs. E. C. Atwood.

DOLORES COUNTY.

At Rico, work on the Atlantic Cable group of mines operated by the New Jersey Zinc Co., is suspended and the miners paid off. The suspension was caused by a strike of the men for $3 per shift, instead of $2.50, which they were receiving.

GILPIN COUNTY.

Near Central City, Mgr. P. McCann of the Kansas-Burroughs Con. M. Co., in the Phœnix-Burroughs shaft, will go to a depth of 1200 feet. The company employs 150 men; its daily shipments average 125 tons.

LAKE COUNTY.

The Yak tunnel progresses 6 feet daily. The mules are to be superseded by horses.

The Yak M., M. & T. Co. are over 8000 feet on their tunnel.

SUMMIT COUNTY.

The Breckenridge Journal learns that the North American Gold Dredging Co.'s placer, on the Swan river, will be developed and that the dredger boat and hydraulic lift systems will be fully tested.

TELLER COUNTY.

(Special Correspondence). — The Colorado Springs & Cripple Creek District Railway Co. have two electric power plants—one at Lake Moraine, near Pike's Peak, and the other at Cameron, at foot of Bull hill. The generators at the Moraine station generate at 6660 volts, which are transformed down to 350 volts for the rotary converters at the Cameron station, the latter converting the three-phase alternating current to 500 volts direct current, for line work. At the Cameron station are two rotary converters, 200 K. W. each, and a 225 K. W. generator, which will be operated by steam power equipment at same station.

Cameron, June 13.

(Special Correspondence).—The Strong mine is closed down, pending the installation of new equipment and the building of new gallows-frame and shaft-house. The new hoist is a 20x40 inch, first-motion, Webster, Camp & Lane make; two new boilers are tubular and 260 H. P. each; the gallows-frame is of heavy Oregon pine timbers and will stand 60 feet above the surface; engines and boilers are being set in substantial masonry. The Strong shaft is now at a depth of 825 feet; when the new equipment is ready for work

sinking will be continued to 1000 feet depth.

Victor, June 14.

(Special Correspondence.)—The Detroit Mill: The milling plant of the Detroit Reduction Co., near Independence, Cripple Creek district, is now operating, under the superintendence of O. F. Barnes. The machinery for the mill was supplied by the Colorado Iron Works, and in design and arrangement includes some features of special interest. In general, the plan provides for fine crushing and pulverization, drying and pan amalgamation, the last-named being assisted by chemical and electrical action. The ore, passing through roughing rolls, is elevated to a three-mesh screen, below which is an automatic sampler. The material which is too coarse to pass the screen is returned to the crushers, that which goes through the screens dropping into a system of bins and thence to a revolving drier. From the drier it passes through a finer set of rolls, is elevated to an eight-mesh screen, thence to a set of narrow-faced, high-speed rolls, which reduce the ore to thirty and fifty mesh. From the high-speed rolls it drops into bins, and from them is fed to a specially designed pulverizer, consisting of a cylinder containing two discs, the latter revolving in opposite directions at the rate of 750 revolutions per minute, the result being to pulverize the material to about 150-mesh.

A pipe extends from the pulverizer upward about 7 feet, where the pipe expands into a large dust chamber, which is connected with a fan. Here a separation of fine dust is made from the coarse, the fine dust passing through a pipe into a centrifugal trap, in the bottom of which the most of the fine dust is precipitated. That which is not collected in the trap is drawn into a second dust box, from which the air is returned to the pulverizer, making a closed circuit, within which the dust is confined. Pipes also connect these dust chambers with the rolls and screens in the mill, the result being that the mill is quite free from the dust that is so frequently conspicuous and wasteful in a dry-crushing mill. From each dust trap a hopper lets the dust fall through pipes into the treatment pans; but attached to each hopper is a measuring machine, which automatically measures the quantity of material passing from the hopper.

There are eight treatment pans, each 8 feet diameter and 3 feet high; four are ranged in an upper row and receive the fine-mesh material in perfectly dry condition; but in these pans it is mixed with water and submitted to chemical and electrical action, which prepares it in about two hours' time for amalgamation in the other four pans ranged in a lower row. Each upper pan takes a charge of about three tons; when the treatment is complete in the upper pans the charge is drawn into the amalgamating pans. The pans are provided with steam jackets, by which the pulp is heated. Finally the tailings, or residue, from the amalgamating pans pass into settlers, thence over Bartlett concentrating tables, where a concentrate saving is made and where such mercury is caught as may have escaped from the settlers. The mill is capable of treating from 80 to 100 tons of ore per day. The stockholders, principally, are Detroit men.

Independence, June 15.

(Special Correspondence).—As has been noted in the daily press, the Secretary of the Interior has ordered a reopening of the Hull City placer case, involving the government patent to grounds of the Independence Town & Mining Co. at Independence, Cripple Creek district. This ground was taken originally as placer claims, and in the contest fought out a year or two ago the Commissioner of the General Land Office decided against the Independence T. & M. Co. and held the claims subject to cancellation, but was reversed by Secretary of Interior Bliss and patent was issued. Present Secretary Hitchcock has reviewed the case and supports the rulings of Commissioner Hermann. The property in question possesses equipment, buildings and improvements worth about $50,000. The mine is well developed and has been a rich producer for the past two years. Pending the forthcoming litigation, it is likely that a receiver will be appointed and the mine operated.

Victor, June 16.

(Special Correspondence).—The Eagle Ore Sampling Co. has been organized, with E. F. Holden, president: J. C. Jenkins, treasurer; J. Key, vice-president; W. O. Jenkins, secretary; N. Franklin, general manager. A new sampling plant of 300 tons per day capacity is nearly completed, its location being on the southern slope of Battle mountain, near Goldfield. They expect to be operating by the middle of July. The method of handling the ore will be entirely automatic, the plan of building and arrangement of machinery having special regard for that object. This sampler runs its trackage, having about 3000 feet, and can connect with the F. & C. C., the M. T. or the new Colorado Springs line. Manager Franklin was several years in charge of the State ore sampler at Blackhawk, Colo.

Goldfield, June 16.

Special Correspondence). — The June output of Cripple Creek ores will not be up to the general average for the district. It is not expected to reach over 40,000 tons. The falling off appears to be in milling ores rather than smelting, which indicates a readiness to ship high grades principally. This month seems to be set apart for repairs, new equipment, reorganization and a general curtailment of production to get ready for work under different arrangements.

No one familiar with the district has failed to observe the progress of consolidation which has been such a marked feature during the past year. This tendency appears to gather momentum as time advances and is rapidly transforming the district of hundreds of individual mines into a district of a dozen great groups of mines, controlled by that number of powerful syndicates. It is pending these consolidations that production is curtailed. It is not to be doubted that the eventual result will be a greatly increased tonnage and a better systematized industry, but that it will minimize and restrict the opportunity of the individual or the company with small capital there remains no question. The developments of the district to a great degree have been accomplished by lessees and leasing companies, but the growing tendency has been to discourage this class of operators by making terms of lease shorter and conditions more difficult.

The mines controlled by the Woods Investment Co., the Stratton-Independence combination, the Isabella, Portland, Elkton Consolidated, Mary McKinney, Vindicator, Lillie, Strong, Victor, Independence T. & M. Co., Union, Lucky Gus, Anchoria-Leland, and a few others, produce the great bulk of district ores and a few of these have been acquiring additional territory in the district at a great rate within the past year.

However, the erection of new reduction plants still goes on, and when the characteristic Cripple Creek energy shall be directed to the production of low-grade ores there will be facilities for treating a tremendous tonnage. Besides the five or six mills in the district, the one at Colorado City and three at Florence, all dependent upon Cripple Creek ores, an additional plant, known as the Milliken mill, is being pushed to completion at Florence, and will have a capacity of about 600 tons. The Rocky Mountain smelter is also to be erected at Florence. It will be designed for general work and it is said will be partly on the same plan as the Bi-metallic at Leadville. WASCOTT.

Cripple Creek, June 16.

W. S. Stratton has secured the property which belonged to the Chicago-Cripple Creek Co. before the insolvency of that corporation for $85,000.

The Victor correspondent of the Republican notes that one of the results of the consolidation movement in progress will be to enlarge the prospecting field of the district, by sending the companies which have been selling their inside holdings out to the outer rim of the properties, in order to retain their existence. The men with cash to pay are taking up the undeveloped claims in the heart of the district and driving idle companies either out of existence or to outside hills. The rapidity with which the valuable territory is passing into the hands of large operators indicates that it will not be long until it will be rarity to find a company with less than 40 acres retaining a foothold on any of the big hills. The trouble has always been that there was too much good ground lying idle in the vicinity of big mines, to allow the outer hills any chance for attention, but with such territory passing into the hands of rich companies, besides being thoroughly exploited, the opportunity of the outer hills arises.

The Greater Gold Belt M. Co. have ratified the sale of the Badger Boy claim to C. W. Kurie for $95,000 net. The directors have declared a 2-cent dividend, $75,000, payable immediately. The $19,000 will be used to develop the Ivanhoe claim, near the Badger Boy.

The Pharmacist Con. M. Co., have leased their property to Boston men for two years; royalty, 25%.

The report of Stratton's Independence for May shows that the production for the month amounted to 3635 tons ore, average value $73 to the ton in gold. The best record made any one day was the 23d, when 150 tons of ore averaging $120 to the ton was shipped, making the gross output for the day $18,000. The largest tonnage was on the 27th, when 200 tons of $75 ore was shipped from the property.

The shipments made from the property for the first ten days, and the average value of the ore, are as follows: May 1, 110 tons, average value $70; May 2, 110 tons, $65; May 3, 90 tons, $75; May 4, 100 tons, $60; May 5, 95 tons, $70; May 6, 110 tons, $65; May 7, 90 tons, $70; May 8, 90 tons, $70; May 9, 115 tons, $65; May 10, 115 tons, $80.

During the first week of June there was mined from the property 1115 tons of ore averaging four ounces gold to the ton.

The Lanterman Co. is shipping 100 tons a month, value $50, from stopes north of the 150-foot level.

IDAHO.

BLAINE COUNTY.

The mill at the Star mine, near Hailey, is daily making one and one-half tons of concentrates.

SHOSHONE COUNTY.

Wardner News: The Empire State M. Co. has let a contract for the longest flume ever built in northern Idaho, to be built on Pine creek and almost 16 miles in length.

MISSOURI.

There is decline in the price of zinc ore during the past year from $50 a ton to $25. The zinc mining industry has been built up with prices of ore ranging from $9 to $18 per ton; a fair profit can be made with high grade ore selling at $20. With ore selling from $45 to $50 per ton, enormous profits were possible.

From Joplin the American Zinc, Lead & Smelting Co. reports its output for the week ending June 10th to be 409,720 pounds zinc and 96,020 pounds lead.

MONTANA.

CASCADE COUNTY.

A second chute of copper glance ore has been found in the east drift of the Northern Pacific mine at Copperopolis.

FLATHEAD COUNTY.

Near Libby the Snowshoe mine is working eighty-five men. It will require 800 feet yet to carry the tunnel through the mountain. It is in about 2000 feet. Concentrates are shipped to the Great Falls smelter.

NEVADA.

HUMBOLDT COUNTY.

The Glasgow & Western Co. has discharged all but four of the miners employed at its Adelaide property, south of Golconda.

LINCOLN COUNTY.

In the April Fool mine at De Lamar six tunnels have been run in on the vein; the lowest one, No. 6, is in over 3000 feet. From this tunnel a shaft has been sunk and two levels cut upon it, drifting both ways on the vein, the ore averaging over an ounce of gold.

ORMSBY COUNTY.

The Nickel Syndicate cases are again in the United States Court. It seems that Attorney Deal sold the property under a judgment after advertising it but twenty days, under the State law, while the United States statutes require a longer publication.

WASHOE COUNTY.

Lone Pine district, 30 miles east of Fort Bidwell, reports a quicksilver find. L. S. Greedlaw says: "Several assays have been made showing 866 pounds of pure quicksilver to the ton." From another piece of rock was extracted "five globules as big as No. 12 shot, by means of retorting a tablespoonful of the rock."

WHITE PINE COUNTY.

The Chainman, at Ely, reports 4 feet of ore averaging $26.40 gold per ton.

The Nevada Copper M. & M. Co. has incorporated at Salt Lake, Utah, at $25,000; H. Barnett, secretary. The company owns the Copper King mining claims Nos. 1 and 2, in the Duck Creek mining district.

OREGON.

BAKER COUNTY.

A. Geiser has bought a half interest in the Brazos mine from E. and R. Blewett. It is locally reported that he will put a stamp mill and hoisting machinery on the property at once.

Surrounding Sumpter, within a radius of 20 miles, are 2000 quartz locations, 25 of which are producers and 200 others which have $3000 worth of development work done upon them. Within the same radius are 100 placer mines that are worked annually. Besides these, copper has been located.

JACKSON COUNTY.

J. J. Martin will reopen the Seattle Co-operative Co.'s mine in Applegate district.

J. S. Howard, of the High Line Ditch Co., Gold Hill, says work begins in September. The ditch is to tap Rogue river at the upper rapids, and will be 94 miles long, terminating at Gold Hill. There will be 11,000 feet of flume, 11 feet wide and 6 feet deep, using 1,500,000 feet of lumber in its construction. Where excavated, the canal will be 14 feet wide at top, 8 feet at bottom, and 6 feet deep. A right of way 50 feet wide has been obtained through the railroad and desert lands along its route. The grade is 1 inch in 1000, or 5.28 feet per mile, and the velocity of the current will be 3.96 feet per second, or 2.7 miles per hour. The capacity will be 15,681 cubic feet per minute, equals 10,455 miners' inches. Two siphons are figured in the estimates—one at Trail Creek canyon, 2870 feet long, 400 feet depression, with 40 feet head, consisting of three parallel lines of 34-inch diameter steel pipe. At Elk creek a similar siphon, 4740 feet long, will cross the canyon. These pipes will save the construction of over 20 miles of canal in a rugged country. The company hopes to put the work through within one year after the excavators have been put to work. Several hundred men will be given employment during its construction, which will be begun at the upper end, in order to float the lumber needed for flumes and culverts down from sawmills to be erected above. The ditch will supply water for a number of placer mines in that vicinity.

UTAH.

SALT LAKE COUNTY.

The new mill at the Fortune mine at Bingham is in operation.

The present daily capacity of the Highland Boy plant, 240 tons, is to be increased to 500 tons.

The Bingham C. & G. M. Co. is excavating the preliminaries for its new plant at Bingham Junction.

The new $1,000,000 smelter of the American Smelting & Refining Co. will be built at Sandy. A. Raht has charge of construction. The ground upon which the old Mingo plant now stands is to be utilized. The plant will be completed within a year. Until then the Germania works at Murray will continue in operation, after which they will be closed down and converted to the scrap pile. The Hanauer plant will not be resurrected, but all the smelting operations conducted at Salt Lake City by the trust will be centered at Sandy.

SUMMIT COUNTY.

The lease on the Apex mine at Park City has expired; the management will operate the mine themselves and have re-engaged their former superintendent.

The jury in the $2,000,000 damage suit of the Crown Point M. Co. against the Ontario returned a verdict of $32,092. Both sides consider it a victory, it deciding that the apex passed out of the side line. Each side is granted sixty days to file a bill of exceptions.

WASHINGTON.

United States Assayer Wing, reporting on the mineral resources and production of the State, says: Metal yield for 1899 aggregates a total of over one million dollars, as is shown by the following tabulated statement:

Metals.	Quantity.	Value.
Gold, fine ozs...	35,284.19	$ 729,387 82
Silver, fine ozs., coinage value.	289,660.67	374,510 76
Copper, fine lbs., @ $17.61 ℔ cwt	76,410.00	13,455 80
Lead, fine lbs., @ $4.47 ℔ cwt...	1,032,069.00	46,133 48
Total value.....		$1,163,487 86

FERRY COUNTY.

At Keller a 350-foot tunnel will be driven on the Legal Tender; the ore gives gold and silver values of $12.50.

OKANOGAN COUNTY.

W. H. Thompson of the Gold Standard group, in the Slate Creek country, is arranging for a stamp mill and crusher, to cost from $15,000 to $18,000.

Palmer Mountain Prospect: At the Golden Zone, Loomis, 1000 tons of ore has been milled with a cleanup result for a thirty days' run of about $10,000, one-third of which is taken up by amalgamation and two-thirds in concentrates. A saving of 85% of assay values is made. The mill will be increased to fifty tons capacity.

SKAGIT COUNTY.

Anacortes reports that the Eureka group, Slate Creek camp, is sold to C. D. Lane of California. This property several years ago was under bond to Montana men, who allowed their bond to lapse after spending $50,000 on the property. The original bond was for $88,000, and the cash selling price is said to be nearly that sum. C. W. Tozier, under whose supervision the Eureka has been developed, will finish the tramway between the mine and the stamp mill. The mill has ten stamps, 1100 pounds each. It is the intention to put in a roasting furnace.

FOREIGN.

BRITISH COLUMBIA.

At Rossland, miners sinking the new five-compartment shaft of the Le Roi mine, have made connection with the up-

raise from the Black Bear tunnel. The shaft is timbered and enlarged to the full standard size. Sinking to the 900-foot level has begun.

S. H. McCoy of Rossland has submitted to the Mabel management at Lima, Ohio, plans for the development of the property, aggregating $30,000, and is told to go ahead.

From Greenwood Supt. Johns reports a strike at the 200-foot level of the Sunset in Deadwood camp, 320 feet from the shaft. The mine is owned by the Montreal-Boundary Creek Co.

The spur from the main line to the Granby smelter is completed; the Knob Hill and Old Ironsides mines at Phœnix are now able to ship continuously, these two mines having over 8000 tons in the ore bins waiting for cars to carry it away.

At Rossland the Iron Mask mine has shut down pending the determination of questions involved in the litigation with the Center Star as to the apex and continuity of one of the veins.

The Miner says a little platinum was produced last year at Quesnelle and other places. From the Similkameen comes the record of fifty-five ounces. Many of the placer miners do not seem to know its worth and throw it away as so much black sand. W. F. Robertson states that the crude platinum sand, as washed out, is worth from $12 to $15 per Troy ounce.

The following is furnished by S. S. Fowler of the Ymir mine at Ymir regarding the first year's run of the 40-stamp mill. The duty of the mill has been as follows:

Running time of 40 stamps.	Tons crushed.
March, 2 days 13 hours	250
April, 16 days 6 hours	1,700
May, 17 days 4 hours	1,450
June, 21 days 14 hours	2,107
Sept., 14 days 18 hours	1,550
Oct., 27 days	2,790
Nov., 29 days 5 hours	2,943
Dec., 23 days	2,348
Totals. 172 days 12 hours	17,137

Average crushing, 99⅓ tons per 24 hours.

PRODUCT AND INCOME.

	Tons.	Tons.
Old dumps		5,061
Stoped carbonate	273	
Galena	112	
Milling	12,725	13,110
		18,171
Ore milled	17,137	
Ore smelted	385	
		17,522
Ore on hand Jan. 1st (milling)		549

CRUDE ORE.

	Ozs. gold.	Ozs. silver.	Per ct. lead.
Average assay	4.251	25.05	35.2

Return, $35,808.89.

MILLING ORE.

	Oz. gold.	Oz. silver.	Per ct. lead.
Av. assay recovered	0.3965	.893	1.11

Return, $142,356.93, of which $117,259.84 was derived from 9983.36 ozs. ore bullion, .561 fine in gold and .387 fine in silver, and $25,097.09 from 1026 tons of concentrate of average assays 1.173 ozs. gold, 11.16 ozs. silver and 18.61% lead. Distribution of gold and silver per ton of mill stuff is:

	Oz. gold.	Oz. silver.	Per ct. lead.
In bullion	.3263	.225	.....
In concentrate	.0702	.668	1.114
Totals	.3965	.893	1.114

TOTAL METAL MARKETED.

	Ozs. gold.	Ozs. silver.	Lbs. lead.
In bullion	5,591.297	3,861.89	.....
In concentrate	1,202.983	11,448.96	381,918.8
In crude	1,637.711	9,657.18	270,917.5
Totals	8,431.991	24,968.03	652,836.3

Based on total tonnage (17,522) of crude and milling ore treated, the average assays are: Gold, .4812 oz.; silver, 1.425 ozs.; lead, 1.863%, and the average gross per ton is $10.168, and of the total income ($178,165.82) the following amounts and percentages are derived per ton treated:

	Amount.	Per ct.
From bullion	$ 6.692	65.8
From concentrate	1.432	14.1
From crude ore	2.044	20.1
Totals	$10.168	100.0

SUMMARY OF OPERATING COSTS.

Mine—	Labor.	Other charges.	Totals.
Stoping	$15,491.15	$2,411.14	$17,902.29
Repairs	464.75	126.06	590.81
Surface work	890.37	....	890.37
			$19,383.47

Tons stoped and treated, 12,087; cost per ton, $1.6037.

Old Dumps—	$3,224.11	$267.54	$3,491.65

Tons handled, 5061; cost per ton, $0.6899.

Tramway—			
Operating	$2,114.84	$518.21	$2,633.05
Repairs	268.05	59.41	327.46
			$2,960.51

Tons trammed, 17,137; cost per ton, $0.1727.

Mill—			
Operating	$6,837.52	$3,166.38	$10,003.90
Repairs	1,391.64	900.28	2,291.92
Prelim. ex.	.....	772.54	772.54
			$13,068.36

Tons milled, 17,137; cost per ton, $0.7627.

Transport—

Bullion expressage, $221.10; ozs. shipped, 9988.3; cost per oz., $0.0221.

Concentrate—			
Sacking and shipping	$724.63	$2,558.29	$3,282.92

Tons shipped, 1026; cost per ton, $3.1997.

Crude Ore—			
Sacking and shipping	$502.98	$870.43	$1,373.41

Tons shipped, 385; cost per ton, $3.5673.

Assaying	$ 1,193.52
Salaries	5,104.30
Office and travel	2,459.27
Taxes and insurance	2,168.08
Legal expenses	649.81
General and other contingent	2,856.57
	$14,431.55

Tons, 17,522; cost per ton, $0.8237.

MEXICO.

J. W. Thompson, Supt. Sahuayacan mines, Jesus Maria district, 130 miles west of Guerrero, State of Chihuahua, is instructed by the stockholders to buy $30,000 mining and electrical machinery.

At El Oro the management of the American M. Co. has been assumed by A. F. Bird from London.

SIBERIA.

The following note has been received at Washington, D. C., from the Russian embassy:

"WASHINGTON, May 14, 1900.

"MR. SECRETARY OF STATE:—The question of gold mining on the Russian Pacific coast has called forth numerous inquiries addressed both to the imperial embassy and to the Russian consulates in this country by citizens of the United States who are desirous of participating in the exploitation of the mineral wealth in Russian territory. Erroneous views have arisen in this connection which it is my duty, in the interest of our two Governments and for the prevention of any misunderstanding, to rectify.

"The Imperial Government granted, under date of the 11th ult., the exclusive right to exploit the mineral wealth in the Peninsula of Tchoukotsk to Col. Vonliarliarsky of the Russian Guards. This gentleman has organized an expedition, under the direction of Mr. Bogdanovitch, a mining engineer, which sailed from Russia on May 1st for the Peninsula of Tchoukotsk via the United States.

"According to information which I have received from various quarters, numerous gold seekers propose to come from Alaska in the course of the year to the Russian territory to which the aforesaid Russian expedition is bound, which expedition, as I have already had the honor to inform Your Excellency, is alone authorized to carry on mining operations in the country.

"In apprising you, Mr. Secretary of State, of the measure adopted by the Imperial Government, whereby the exclusive right to exploit the gold-bearing lands and others is conferred upon Col. Vonliarliarsky, I have the honor to beg you to bring this measure to the notice of the United States authorities that are interested, with a view to the avoidance of regrettable misunderstandings.

CT. CASSINI."

Mining of all kinds in Siberia has hitherto been beset with so many difficulties as to discourage operators, native or foreign. The concession to an American—D. M. Clarkson—to mine for gold or coal on his own account, without the usual adjunct of a Russian partner, seems to point to a more liberal policy. Still, there are restrictions. Mr. Clarkson and Mr. Emery—the latter the pioneer American merchant of Siberia, who has also been granted special privilege by imperial rescript—can not enter into combination with any existing company nor operate any but new claims, and even then work must be done under disadvantages which would be hardly tolerable to ordinary American prospectors. For example, one must have special permits from local authorities for felling trees and constructing roads, and there are certain rules to be followed when minerals other than those specified in the grant, as copper, iron, etc., are found.

The mineral wealth of this region has been for years practically untouched. Chinese have worked the auriferous sand on a small scale, and even now they are thrashing over the old material with minimum success. The complaint has been that there was no capital to develop the mineral deposits; yet, within four years, Belgian, English, French and American experts have visited Siberia, examined the various districts and advised the formation of companies for the exploitation of mines, but prudent foreign companies withheld the capital, mainly because of the governmental restrictions.

The quartz gold mines on Askold island, near Vladivostock, are owned by a Russian firm and have been worked for two years with gratifying results. In 1897 the gold was first discovered; in 1898–1899 prospecting was begun; in the spring and summer of 1899, 500 tons were extracted with poor machinery, the estimated value being $25,000. Some thirty odd tunnels have been prepared, and the managers hope to obtain this year 3000 tons of quartz, worth perhaps $150,000, and about 9000 tons of quartzite. They anticipate from the prospecting of 1900 some $50,000 to $75,000 clear profit. The gentlemen in charge of this mine are old residents, naturalized subjects and cautious business men.

Either the announcement of the concessions to Messrs. Emery and Clarkson or the stories emanating from travelers in Siberia have caused many inquiries to be sent to this agency as to the chances for mining in this locality. These inquiries come from Cape Nome, the Klondike and the Pacific coast generally, and in most cases could be answered only at St. Petersburg. It is true the Imperial Government invites all foreign capital to enter its territory for mining or manufacturing purposes; but restrictions are severe. With regard to gold-mining privileges, the applicant must make petition in person here, or he may go to St. Petersburg if more convenient. In the latter case the imperial authorities would refer the matter to the Governor-General here before deciding the case. In no instance would such a permit be hastily granted, and an applicant without references as to character and ability to carry out his plans would undoubtedly be rejected. To land on the soil of the Maritime Province and proceed on one's own account might subject the prospector to murder or robbery on the part of wandering convicts or hostile natives. The Government also exercises strict espionage in matters of passports, permits, etc., and there is a high tax on melting and conveyance from the mine to the government office. The following paragraph has appeared in American newspapers:

"From Port Arthur this summer several Americans have gone into Manchuria to prospect for gold; and, as the Russian Government advances money to bona fide miners and buys the entire output of the gold mines, there is some degree of stability in the venture."

Nothing could be more misleading than such statements. The Russian Government does not yet profess to own Manchuria. It advances no money to miners or manufacturers of any kind, except to those coming within the scope of its administrative policy. It does assist immigrants after they have arrived, but does not pay their way. It buys the output of all mines, on broad grounds of governmental policy, as it controls mining business of whatever character. But this fact would afford little "stability" to the venture of any American who came to Manchuria or the Maritime Province to engage in mining without a special permit, or a Russian partner, or a good supply of capital and abundant machinery.

In this connection it should be honestly said, without any disparagement to the future of Siberia, that it is no special place for Americans. Those who came here twenty-five to thirty years ago did well, but all had either Russian partners or married Russians and identified themselves with the country. Of those who have come within a decade, only one is an independent business man, and his success came from a Russian partnership. The others are in subordinate positions, earning salaries about on a par with what they would earn in the United States. Siberia is no more "a field for Americans" than it is for Germans, Danes or Swedes—indeed, not so much. Most of the young foreigners have a speaking knowledge of one or more languages besides their own. The best chance for Americans here is in the line of mechanical work. A well-equipped machine shop, with competent American artisans and specialists in certain industries, would do well in Siberia; but no American without capital or special skill in his own trade has any business here.

R. T. GREENER.

Vladivostock.

Throughout all Siberia, private individuals may engage in working auriferous gravels on all lands, irrespective of their ownership, whether belonging to the domain of the Empire or even to the Cabinet of His Imperial Majesty. The mining districts of the Altais and of Nertchinsk are exceptions to the rule.

The required special privileges are unique, and not likely to be obtained easily. Their greatest value, indeed, is the removal of certain restrictions which have hitherto prevented a foreigner from enjoying equal privileges with Russians in these two provinces.

Private persons may prospect and work gold reefs in all places where placer diggings are permitted, except in the districts of the Altais and of Nertchinsk, which are the private property of His Imperial Majesty. If veins are discovered in the "pochva" (bedrock) of placers already being worked, owners are permitted to mine them within the legal boundaries of their concessions.

Persons of any condition or nationality (Russian or foreign) who are in the enjoyment of full civil rights may work auriferous deposits. The exceptions are: (1) Hebrews, where local law forbids their residence; (2) mining, legal and police officials; (3) officials of the central general administrative regions; (4) wives and children of such functionaries. In addition, in the Maritime Province and the Amur and adjacent islands on our coast, the right to mine gold or any mineral is reserved to Russian subjects, except in the special grants referred to. Hence, individuals debarred from carrying on gold-mining operations on their own behalf can not act as attorneys or agents for other persons in such matters.

To acquire the right to prospect for either alluvial or quartz gold, all persons or companies must procure a special permit on stamped paper issued by the Department of Mines. Permits contain no time limitations and are not transferable. A declaration in writing must be made to the police department of the locality where operations are proposed. The locality must be designated, as well as names of men belonging to the prospecting party, the date the expedition is to set out and the place of departure. The passport and papers of each person must be accurately set forth. The cost of advertising the permit in the local press must be paid. In free territory prospectors are entitled, so far as placer mining is concerned, to occupy an area of 5 versts (3.3 miles) in length and in breadth the width of the valley in which operations are conducted; in quartz mining, to an area within a radius of 1 verst (0.663 mile) from a post bearing the date when prospecting began and the name of the individual or company. After the post is set up, the right to prospect continues as long as the party stays on the tract so marked out. Should the ground be found sufficiently rich to be worthy of "a request for a location," at least two shafts must be sunk, demonstrating the presence of gold, and "location posts" in place of the "prospecting posts" must be set up.

The district engineer takes note of the copies of the declaration sent to him. He passes upon those meeting the requirements of the law and grants locations according to the requests of the claimants. These allotments of land (otvodi) take place in the spring, summer and autumn, and must be made by a special commissioner of locations (otvodchik) within a period of two years from the date of the district engineer's grant. In eastern as well as in western Siberia the total length of a placer allotment must not exceed 5 versts (3.3 miles) in length, calculated from the "indicator's posts;" in breadth, it may comprise the whole valley to the extent of 250 sagens (1750 feet).

In addition to the land dues and tax per pood (36.112 pounds) there is charged for the transportation of the gold to St. Petersburg: From Irkutsk, 46 rubles ($23.69) per pood; from Tomsk, 33 rubles ($16.99). The conveyance of the gold, in sealed sacks from the mines to the district office of the mining police and thence to the Department of Mines, is at the expense of the mine owner. The charge is 150 rubles ($77.25) per pood.

The operator must bear the cost of melting down the gold. The fee, by the new regulation of February 3, 1897, is uniform—42.315 rubles ($21.79) per pood of pure gold.

Such a tax per pood, at best when it exceeds a certain rate (say, 3% to 5%), is without doubt detrimental to the development of the gold mining industry, at least by outsiders, for it obliges the operator to confine himself to deposits sufficiently rich to enable him to pay this duty before meeting his own expenses.

THE KLONDIKE.

The output of the Klondike district—the washings from the dumps of 560 claims that were worked on all creeks last winter—will, it is reported, amount to $18,553,-

270. This amount of gold was washed from 155,080,180 pans of Klondike gravel. In all 5280 men were employed during the season. This in brief is the story as tabulated at Dawson City May 25. Following is a statement of the season's production in detail:

Claims worked.	Creek.	Men employed.	Total production.
49	El Dorado	541	$3,746,200
13	Gay Gulch	62	106,800
6	French Hill	15	24,900
3	French Gulch	22	48,000
2	Oro Grande Gu'h	15	21,000
8	El Dorado Hillsides	32	32,700
29	Bonanza, above Discovery	315	1,231,900
47	Bonanza, below Discovery	642	1,984,590
34	Gold Hill	235	1,002,000
8	Bonanza Hill	26	52,600
16	Chehecaco Hill	176	712,300
13	Adams Creek	37	92,200
8	Adams Hill	61	195,400
11	Magnet Gulch	96	477,000
16	American Gulch	81	225,000
17	Fox Gulch & Oro Fino	121	702,000
6	Monte Cristo	58	173,500
12	King Solomon's Hill	148	749,100
11	Dominion, above up	68	158,000
31	Dominion, below up	339	1,220,950
10	Dominion, above low	106	277,500
28	Dominion, below low	194	480,460
17	Dominion Hillsides	86	192,250
4	Dominion Tributaries	12	22,850
40	Sulphur, above	275	862,220
29	Sulphur, below	186	594,500
31	Gold Run	446	1,037,950
18	Hunker, above	142	423,100
35	Hunker, below	311	788,000
5	Hunker, benches	59	180,000
8	Gold Bottom	23	39,200
	Quartz Creek	100	200,000
	All other creeks	250	500,000
560		5,280	$19,553,270

The steamer Cutch, from Skaguay, reports excitement over the White Horse copper properties, where machinery is arriving by every train. The last spike was driven on the White Pass Railway between Caribou and White Horse June 17th.

Personal.

M. E. PURCELL is the new Supt. Giant M. Co., Rossland, B. C.

J. A. WARDELL left San Francisco this week for Tientsin, China.

B. MACREADY is now Supt. Quartette M. Co., Searchlight, Nevada.

SEYMOUR WATERHOUSE has returned to San Francisco from Europe.

WILLIAM HART, Supt. John A. Logan mine, Victor, Colo., has resigned.

E. H. BEEBE has been appointed Supt. Con. G. M. Co., Cripple Creek, Colo.

CHAS. BUTTERS is expected to arrive in Salt Lake City, Utah, next week.

NICHOLAS TREGEAR is the new Supt. Winnipeg M. & S. Co., Greenwood, B. C.

A. D. CULLUM of London, owner Castle Peak mine, Mono Co., Cal., is visiting the property.

L. L. MYERS has returned to the North Bloomfield, Nevada Co., Cal., from San Francisco.

W. S. KEYES has returned to San Francisco from giving expert testimony at Park City, Utah.

W. W. KIRKHAM, Supt. La Suerte mine, Grass Valley, Cal., has returned from San Francisco.

A. VAN PATTEN has resigned the superintendency of the Carbonate Hill mine, Morgan county, Utah.

R. J. WALTER, E. M., of Denver, Colo., is at Jackson, Amador county, Cal., in the interest of a mining company.

A. D. HENDERSON is succeeded in the superintendency of the El Dorado, Cal., W. & D. G. M. Co. by J. L. Rowley.

W. C. RALSTON, President California State Miners' Association, has returned to San Francisco from an extended sojourn in the East.

MASTER MECHANIC CULVER of the Ajax, Colo., G. M. Co. is succeeded by H. D. Colburn and has charge of new work on the Goldfield, Colo., water works.

THE Montana School of Mines has chosen A. N. Winchell to fill the chair of geology and mineralogy and C. H. Bowman teacher of mechanics and mining engineering.

T. C. ARCHER, late Supt. Mountain Copper Co.'s mines, Shasta county, Cal., sails on June 25th for southeast Alaska, to examine the copper deposits of that district.

R. C. FREY, late assayer at the Yellow Aster mine, Randsburg, Cal., has a telegram from the manager of the Simmer & Jack mine, Johannesburg, South Africa, summoning him back at once. He had been getting a salary of $500 per month, and when he left there was placed under half pay till called back, from which date he is to have full pay.

CONGRESSMAN BARHAM has returned to California from Washington. He secured a unanimous report from the Committee on Mines and Mining on his bill for a Department of Mines and Mining, creating a new cabinet officer. He regrets, however, that the Senate felt that a Commissioner of Mines and Mining would meet the situation. The action of the Senate may operate to defeat his bill for a cabinet officer, but Mr. Barham feels certain that when the bill for a Department of Commerce and Industries is reported from the Committee on Interstate and Foreign Commerce, of which he is a member, it will provide for an Assistant Secretary of Mines and Mining.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING JUNE 12, 1900.

651,778.—CIGAR BUNCH ROLLER—F. L. Brown, Edmonds, Wash.

651,780.—MOTOR—H. S. Delamere, Ferndale, Cal.

651,457.—MITER BOX—R. H. Dorn, Los Angeles, Cal.

651,503.—RIVETING MACHINE—S. Foreman, Sacramento, Cal.

651,526.—RAIL FASTENER—J. W. Gay, Crowley, Or.

651,351.—BOOK BACKING — F. Hager, Portland, Or.

651,506.—AMALGAMATION—E. Heiligendorfer, Canelas, Mexico.

651,357.—CHECK HOLDER—J. S. Howk, Reno, Nev.

651,629.—NAIL DRAWER—Jordan & Halstead, Visalia, Cal.

651,666.—WATER CLOSET—J. B. Kelly, Portland, Or.

651,762.—WEEDER—L. J. Klinger, Dufur, Or.

651,507.—WEIGHT MEASURER—L. Lacaille, Golden Gate, Cal.

651,512.—MATCHER HEAD—W. W. Phillbrick, Seattle, Wash.

651,725.—ELEVATOR—S. C. & W. N. Ruble, Golden, Or.

651,514.—GUN SIGHT—W. F. Sheard, Tacoma, Wash.

651,395.—CURETTE—M. R. Stapp, Aberdeen, Wash.

651,539.—DESK ARM REST—F. W. Warren, S. F.

651,454.—TIDE MOTOR—M. C. Wilkinson, Los Angeles, Cal.

32,810.—DESIGN — Kate L. Nevins, Rancho Hermosa, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DESK ARM REST.—No. 651,539. June 12, 1900. F. W. Warren, San Francisco Cal. The object of this invention is to provide an arm rest and adjustably attach the same to desks, such as are used by bookkeepers and writers. It comprises a supporting bracket with a slide upon which the lower end of the bracket is pivotally connected so that the bracket may be adjustable in vertical planes. Connected with this is a means for holding the bracket in its adjusted position, and a guide fixed with relation to the desk and essentially parallel therewith upon which the slide is movable so that the rest can be used at any desired point with relation to the desk surface. The arm rest can be disengaged and the whole device turned downwardly and out of the way at will. Ball or other anti-frictional bearings are introduced between the slide and the fixed guide upon which it moves.

BARREL AMALGAMATION OF PRECIOUS METALS. No. 651,506. June 12, 1900. Ernst Heiligendorfer, Canelas, Mexico. This invention relates to an improvement in the amalgamation of precious metal-bearing ores by what is known as the "barrel process." It consists essentially in the employment of copper amalgam in conjunction with what are known as rebellious ores. The operation is carried on in vessels of such material as will not decompose copper sulphate, and prevents the destruction and loss of the quicksilver which would be effected by raw ores containing an excess of sulphur. The use of the copper amalgam in the barrel enables me to not only desilverize free milling ores more perfectly, but to extend the capacity of the apparatus over a wide range of raw ores hitherto incapable of being profitably treated in this class of apparatus.

Book Notices.

"Topographic Surveying," including geographic, exploratory and military mapping, with hints on camping, emergency surgery and photography; by H. M. Wilson; 900 pages, 8vo; John Wiley & Sons, New York, adapted to the needs of the topographer in the field or the student. Plane surveying, map construction, topographic and geodetic surveying are treated; the work is profusely illustrated and so systematized as to make its contents readily adapted. The book is of value to any one contemplating field work. Price $3.50, postpaid.

Recently Declared Mining Dividends.

Napa Quicksilver M. Co., California, 10 cents per share, $12,000	July 2
New Idria Quicksilver M. Co., California, 10 cents per share and 10 cents extra, $20,000	July 2
Horn Silver M. Co., Utah, $20,000	June 30
Isabella G. M. Co., Colorado, 3 cents per share, $67,000	June 21

Latest Market Reports.

SAN FRANCISCO, June 21, 1900.

SILVER—Per oz., Troy: London, 27¾d (standard ounce, 925 fine); New York, bar silver, 60¼c (1000 fine); San Francisco, 60¼c; Mexican dollars, 49½c.

COPPER.—New York: Lake, 1 to 3 casks, 16.65 cash; carload lots, 16.25; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.12½; Casting, 1 to 3 casks, 16.37½; carload lots, 16.00. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $3.77½; Salt Lake City, 3.75; St. Louis, $3.70; San Francisco $5.00, carload lots; 5¼c 1000 to 4000 lbs.; pipe 7, sheet 8, bar 6c. London, £17 5s = 3.75c per lb.

SPELTER. — New York, $4.25; St. Louis, $4.10; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY. — New York, 10c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON. — Pittsburg, pig, No. 2, foundry, $19.50; gray forge, $18.00; San Francisco, bar, per lb., 3c.

STEEL. — Billets, Pittsburg, $27.50; bars, $30.50; San Francisco, bar, 11c to 18c per lb.

QUICKSILVER. — New York, $51.00; London, £9 10s; San Francisco, local, $49.50 ℔ flask of 76½ lbs.; Export, $47.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7½c.

SOLDER. — Half-and-half, 100-lb. lots, 20½c; San Francisco, Plumbers', 100-lb. lots, 17c.

BABBITT METAL.— San Francisco, No. 1, 10c.

TIN.—New York, pig, $30.00; San Francisco, ton lots, 31½c; 1000 lbs., 32c; 500 lbs., 33c; less, 34c; bar tin, ℔ lb, 37c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

BISMUTH.—New York, ℔ lb., $1.60 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

NICKEL.—New York, 50@60c ℔ lb.

TUNGSTEN.—New York, ℔ lb., $1; San Francisco, $1.25.

FERRO-TUNGSTEN. — New York, 37%, 40c; San Francisco, 75c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, $125.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 45@50c ℔ lb.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ℔ set; 14 oz., 40s., 10½c.

NAILS.—List prices per keg: No. 20d to 60d, wire, $3.70; cut, $3.70; 10d to 16d, wire, $3.75; cut, $3.75; 8d, wire, $3.80; cut, $3.80; 6d and 7d, wire, $3.90; cut, $3.90; 4d and 5d, wire, $4; cut, $4; 3d, wire, $4.15; cut, $4.15; 2d, wire, $4.40; cut, $4.40. Special rates on carload lots.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 21, 1900.

9:30 A. M. SESSION.

600 B. & B.....26c	400 Mexican.....20c
300 C. C. & V..$1 55	400 Ophir.....72c
100 Confidence..65c	500 Savage.....16c
500 Kentuck....01c	500 Sierra Nev..29c

2:30 P. M. SESSION.

500 Ophir.....71c	500 Justice.....06c
100 Mexican.....20c	100 St. Louis....12c
300 B. & B.....26c	50 C. C. & V..$1 50
200 Utah.....14c	

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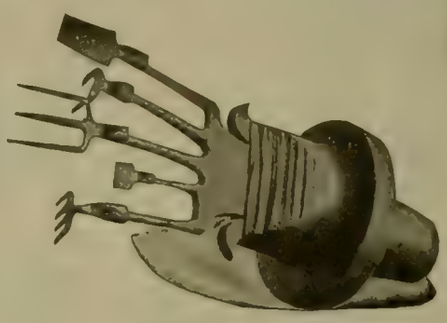

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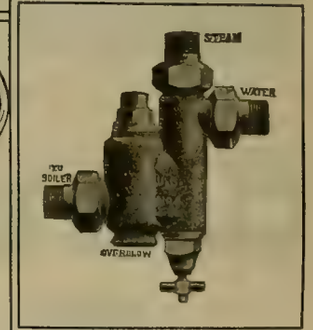
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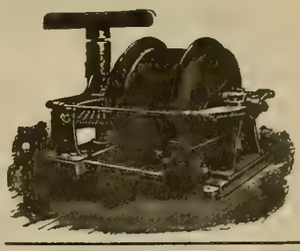


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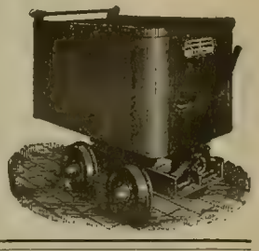
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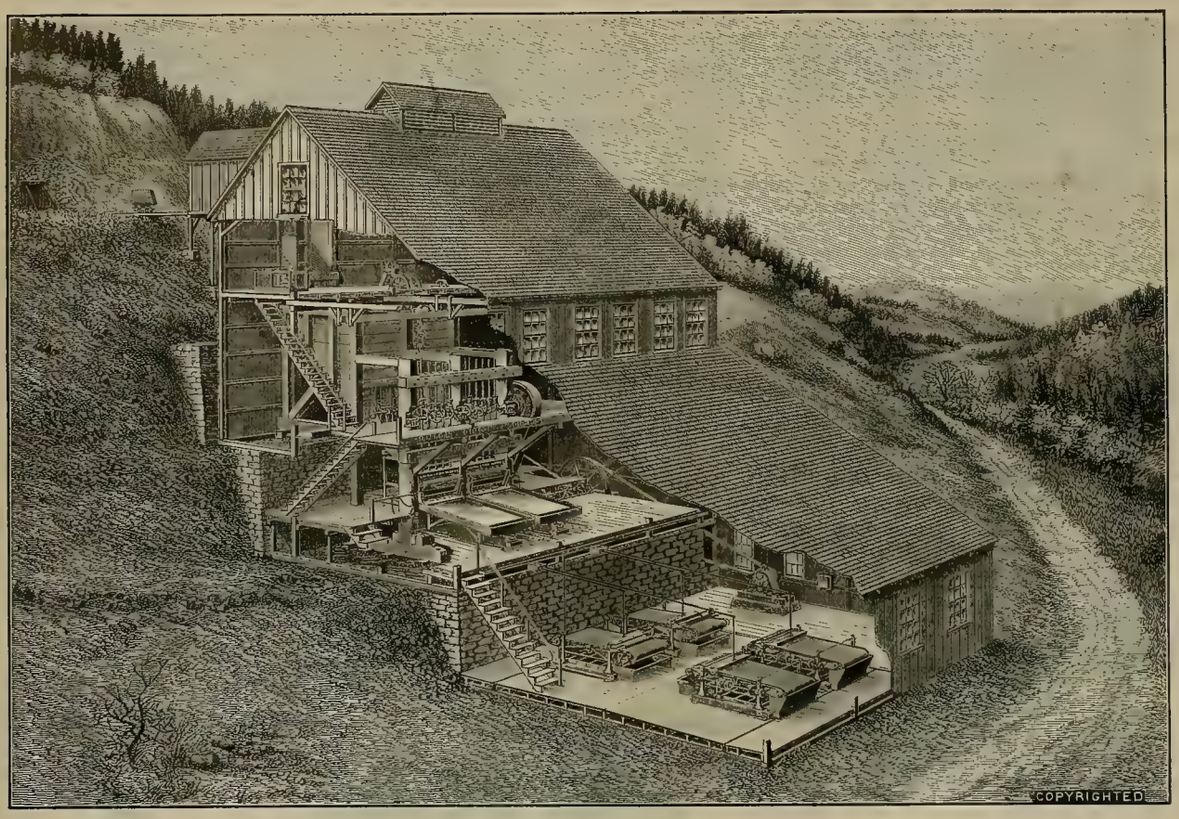
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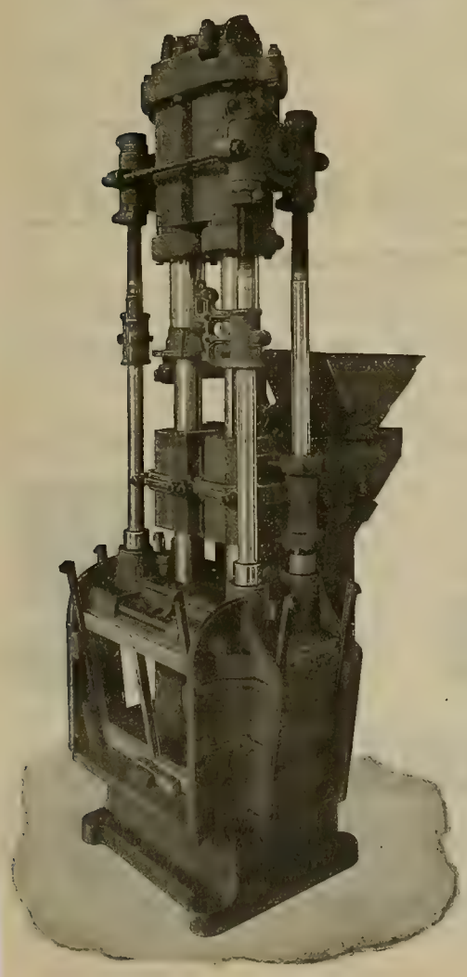
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Very truly yours,

[SIGNED] L. W. ADAMS,
General Manager Murra Gold Mining Co.

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GOLDEN P. O., JOSEPHINE CO., COLO., December 23, 1899.

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The ore we are working at present is soft and we mill in 24 hours, using No. 10 slot screen, 15 tons.

Yours truly,

M. C. DAVIS,
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Running Under Compressed Air in West Australia.

293 ST. GEORGE'S TERRACE, PERTH, W. A., February 6, 1900.

F. R. PERROT, ESQ., AGENT OF GATES IRON WORKS, PERTH, WEST AUSTRALIA.

DEAR SIR: In reply to your enquiry as to the working of the Tremain Mill on the Burbanks Grand Junction, I would state that at the start we worked this from the boiler supplied by the Gates Iron Works Company, but owing to certain irregularities of the running, which were in a measure due to the intermittent supply of ore and the short time that we were able to run it per day, I finally laid on air piping from my air compressor, a quarter of a mile distant, and used the boiler as an air receiver, with the result that I got an absolutely constant run, which, I believe, averaged about 105 drops per minute, and this was kept up with great regularity and showed a much better return in the treatment of the ore. The usual air pressure in this case was 80 lbs., whereas under steam we were not so satisfied with the result as worked at 100 lbs. By this we were also saved in cost the charges of stoker, fuel and water, and it was worked with much greater cleanliness, and during the whole time the mill was running—which was several months—it never froze up on us or showed any signs of trouble in that direction.

The mill is now temporarily stopped, but when it is again started I shall most decidedly continue the use of compressed air.

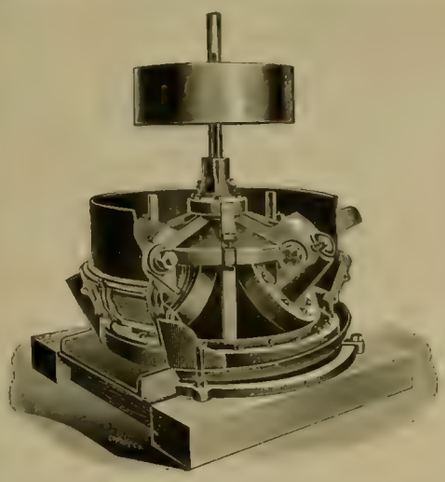
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[SIGNED] GEO. HEWER.

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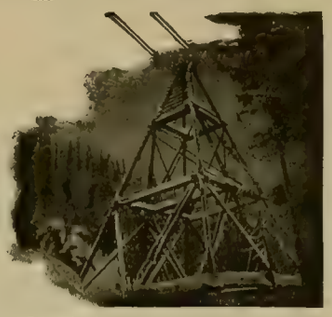
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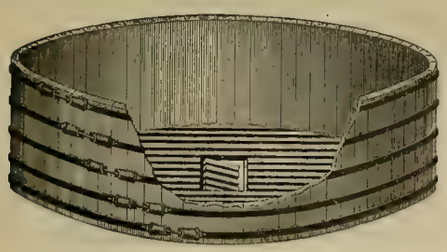
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Report of the California Debris Commission.

An important State and Federal engineering work has been for some years projected, growing out of the necessity of retention of debris in certain California rivers, and the matter has been the subject of considerable attention since 1892. At that time the California State Miners' Association was organized, and through its efforts a State appropriation of $250,000, supplemented by a Federal appropriation of a like sum, was secured in 1896.

Since then the Government engineers in charge of the work have been endeavoring to present a practical and effectual plan that would secure the desired result. There has been unavoidable delay since the inception of the scheme over eight years ago, but many difficulties have been successfully overcome, and the project approaches some definite result. Little has been said in these columns for the past three years concerning the matter, because there was nothing further to do than await the result of the labors of the California Debris Commission. The most recent result is embodied in a report which is this week received from Washington. It is entitled, "Project for Impounding Mining Debris in the Yuba River, California, With a View to the Improvement of Navigation in the Sacramento and Feather Rivers." It is almost entirely the work of Hubert Vischer, assistant engineer to the Commission. Col. Mansfield, Lieut. Col. W. H. Heuer and Capt. Deakyne, U. S. Corps of Engineers, in transmitting the report endorse it. They say: "The Commission believes the project practicable and worthy of adoption, and so recommends. It is the only one thus far evolved which gives reasonable hope of success, and at a very moderate cost for storage. Mr. Vischer's labor, thought and skill in working up a project of such unusual character and scope merits our highest appreciation, and is worthy of every commendation."

This report the Commission makes to Gen. Jno. M. Wilson, chief of engineers, U. S. Army.

In transmitting the report to the Secretary of War, Gen. Wilson says: "The views and recommendations of the Commission are the result of careful study and investigation for a period of over five years, and I recommend the approval of the project submitted."

The last eight words are the most important ever uttered by an official in that position regarding the whole matter, which has been such a vexatious problem to the California hydraulic miners and valley residents affected. Those eight words have a magical potency in putting forward the proposed work. Upon the receipt of that recommendation from the highest and last authority, the Secretary of War transmitted the report to the Speaker of the House of Representatives. Congress at the recent session acted affirmatively, and the plan thus endorsed and accepted now has opportunity of being tried, the money at last being available.

The above is a plain statement of the facts to date concerning a subject of which so much has been written.

We will now give a few salient points from the report, which is a bulky one. For proper understanding of the subject, an engraving is here reproduced of barrier No. 1 from the accepted plan of the work.

The Commission selected the Yuba river as the site of the proposed barrier, as that stream carries more detritus than all the other tributaries of the Sacramento river combined. The project has for its primary object the storage of mining debris within the bed of the Yuba river by a system of works designed to separate the coarse material from the fine, and for a secondary object the controlling of the low-water channel within narrow and well-defined limits, in order to preserve in place the extensive deposits in the river below, the general scheme being to erect several barriers across the bed of the river, and to form a settling basin three miles long and half a mile wide on the south side of the river, this settling basin to consist of a levee protected against wash, to be built in the bed of the river, with its upper and lower ends connecting with the existing levee and shore on the south bank; these end walls to have inlet and outlet weirs and conduits to regulate the inflow and outflow of river water, and to cause the finer material carried in suspension to be deposited and held in the settling basin, through which, at all except extreme flood stages, the river will be compelled to flow; and below this basin to confine the river channel within well-defined lines by necessary training works:

The upper barrier will have a height of about 40 feet above the present bed, and will extend entirely across the river. Its crest length will be 1000 feet. This barrier is to consist of gravel, cobbles, brush, rock paving, and some masonry in its lower slope; a masonry crest, and a double row of sheet piling in its toe. It is to be built up gradually, the river flowing over it, and its chief function will be to impound coarse material behind it and form a new grade for the tailings, extending up to and beyond the Narrows.

Barrier No. 1 (see engraving) is to be located about ½ mile below barrier No. 2. Its general construction is very similar to that proposed for No. 2. Its height will be 18 to 26 feet above the tailings now in the river, and the crest length proposed is 1100 feet. At its northerly end will be a by-pass, with a weir 600 feet in length, which will in extreme flood stages (assumed at 125,000 cubic feet per second) permit a flow over the lip of the weir 7 feet in depth, with a flow over the dam estimated at 3½ feet.

Barrier No. 1 makes a water cushion for barrier No. 2. At all but flood stages of the river the flow will be through the by-pass or weir.

Both barriers together may raise the plane of river deposits about 40 feet, and are estimated to store, on an assumed gradient of 15 feet per mile, a volume representing 36,000,000 cubic yards of coarse material, at a cost of about $\frac{7}{10}$ cent per cubic yard.

The next structure, a flood overflow barrier, is to be located about ½ half mile below Dry creek. It is to be a composite structure, consisting of some crib work, with rock filling and paving, and some sheet piling. It is a low structure, 4000 feet in length. During floods it will be submerged; at other stages of the river it will direct all the water into or through the settling basin.

The next barrier is to abut against Daguerre Point, extending south to the levee or embankment of the settling basin. Its crest length will be 3000 feet and its general height 14 feet.

A cut is made through Daguerre Point to rectify the flow and to share with the northerly half of the barrier the duty of passing the flood waters. This barrier is to be essentially a brush and gravel structure, heavily protected with rock.

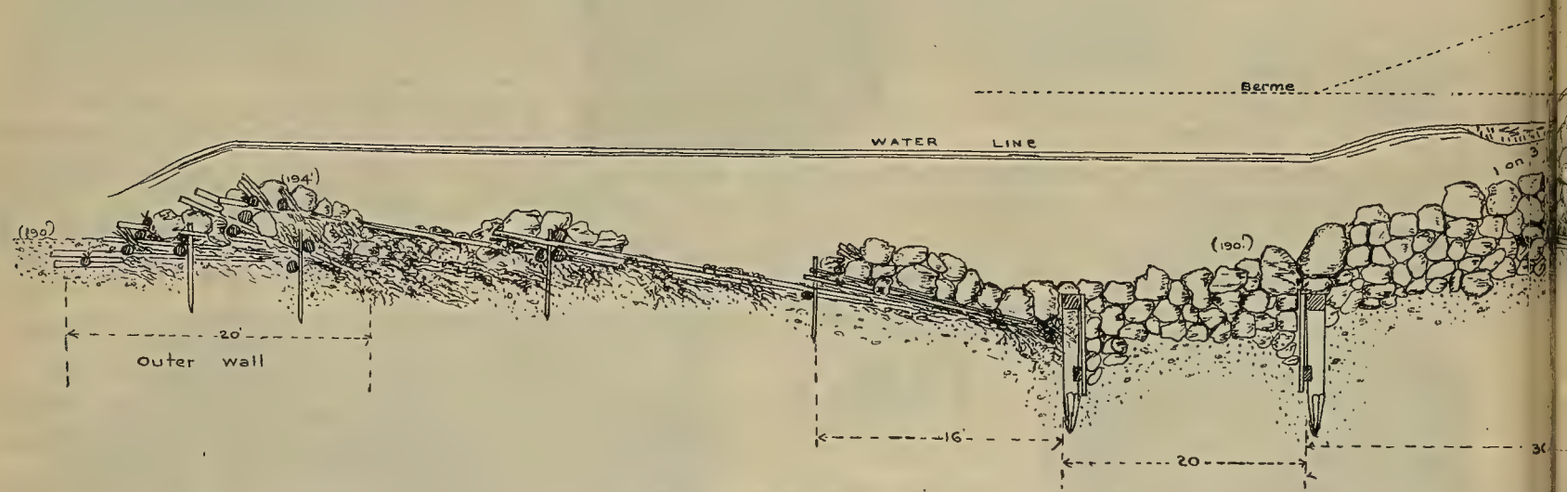
The flood overflow barrier directs the ordinary flow of the river into the settling basin through inlets in the embankment forming the upper end of the basin.

The basin, as designed, is capable of holding about 14,000,000 cubic yards of fine sediment, and by extending it farther to the westward it can be enlarged to a capacity of at least 50,000,000 cubic yards additional. The project, as here outlined, is estimated to cost about $780,000, exclusive of the land required (about $20,000 more).

The project as submitted is novel, since nothing of the kind, so far as known, has ever been attempted, and it is to a certain extent experimental. The various structures are simple, and are believed to be safe, practicable, and reasonably permanent. They can be repaired if required, and if abandoned, not maintained, or never completed, can not leave the river in any worse shape than at present. If constructed, it is believed that they are capable of storing the debris now in the Yuba river and its tributaries, which is far in excess of that in all the other tributaries of the Sacramento river. The result of the storage can not be otherwise than beneficial to the navigation and commercial interests of the Sacramento and Feather rivers. The Commission says: "Especial attention is invited to the fact that the object sought to be accomplished is the storage of the detritus now in the Yuba and its tributaries, with a view to the improvement of the rivers below, and decidedly not with the view of permitting unlicensed or indiscriminate hydraulic mining at localities above the impounding works.

"When the works have been completed and in operation for several years there will be time and opportunity to determine whether or not the system is capable of sufficient expansion to warrant an attempt at storing therein the tailings from the hydraulic mines without compelling each mine to impound any or all of its debris."

In the concluding part of his report Mr. Vischer says: "Only a general scheme of operations can be mapped out for such work in advance, a detailed estimate being, of course, out of the question. The work would resolve itself into a multitude of small works, some of them too trifling to require any plans, and would be of the character best covered by the daily labor of an intelligently directed work force, but not necessarily one kept always organized. The operations would consist in clearing lines of brush to facili-



SECTION, DRAWN TO SCALE, OF PROPOSED BARRIER NO.

tate flow, in blocking side channels gradually to obstruct it, in building brush work for spurs to direct current, or for silt arresters to build up land, the work wherever possible to be disposed at the training walls or near by, but not following any prescribed line. The lines of training wall, so called, would actually be property lines, inside of which liberty should exist to conduct work with perfect freedom. There might be some dredging or snagging to remove obstacles in the path of flow, but seeing that the drainage from the settling basin is intended to follow a southerly route, operations during the dry season of the year would not be interfered with by water. The outcome, perhaps attainable at the end of several years, would be a well-defined river channel of good capacity, bordered by lands which would overflow and form part of the river during flood, and back of these there would be private lands in process of reclamation, but perhaps still subject to periodical inundation. In brief, the idea is to cause the river to make deposits where desirable, but otherwise to prevent them. Such work is very desirable and should not be needlessly deferred, and it is therefore suggested that an item to cover the cost—for instance, $50,000—should be added to the estimate for improving Yuba river.

"We have an estimate of the amount of deposit from the Narrows to the State dam during nineteen years, 33,637,000 cubic yards; also an estimate of the fill from the State dam to Marysville for six years, 14,238,000 cubic yards, but no figures obtained by direct observation for the deposit upon the whole river area for any period at all. But it will hardly be questioned that the deposit over the upper portion of the river must have been relatively less during the last six years than it was for the earlier thirteen. The last six years have been relatively dry years, without notable freshets. Hydraulic mining has been under control since 1893, whereas the first thirteen years cover at least five years when hydraulic mining was at its highest activity. Finally, the sweeping of the upper canyons was pretty well accomplished prior to 1893, as there are reports from actual examination to prove. It would, therefore, appear that we are safely within the facts if we take the sum of the two averages and accept it as an expression of the annual rate of accumulation since 1893. The first average is 1,770,000 cubic yards, in round numbers; the second, 2,373,000, and the sum of both, 4,143,000 cubic yards. This figure may be used as an indicator of the length of time that the storage provided under the project of 1899 would last if there should be no increase of the annual requirement, and under present conditions this requirement should be a decreasing quantity.

"Comparing the foregoing figures with the storage estimates for the higher levels of the Narrows dam, the showing is favorable to the project of 1899, considering only the totals and rates, quite independent of the security afforded by the two systems. The 1899 project possesses superiority also in that it provides for future requirements if need should arise, while the Narrows dam gave no such outlook. Should barriers 1 and 2 be built and meet expectations, additional barriers can be built as required, each being a practical repetition of barrier No. 2, which may serve as a type for all of them. The estimates for the 1899 project are sufficient to cover the storage requirements for several years—perhaps ten, perhaps more. Having indicated the practical identity of the methods proposed for storing coarse material, the estimates made in former years may be accepted as safe figures for the cost as well as for the amounts of additional storage, with the understanding that the figures refer to coarse detritus.

"With this system of storage by low barriers, which do not require bedrock foundations, the objectionable features of the Narrows canyon would disappear, and the gorge, considering its superior rock supply and favorably situated bluffs, would possess advantages which should not be lost sight of.

"It yet remains to show the most suitable manner of disposing of coarse material. May it not, after all, be cheaper and more secure, at least in particular cases, to hold this character of material in the principal tributaries, where the watersheds are, compartively speaking, small, rather than in the main rivers, where the flood exposure is considerable? This question has never as yet been carefully looked into.

"The subject under examination is so broad that it may not be wise to attempt to look too far ahead. For, in attempting to cover more ground than is necessary, there exists danger of inaccuracy as well as in covering too little at the risk of overlooking some important detail. Things are liable to develop in a different manner from that assumed. As an instance of this there is the settling basin for storing fine material. In order to make an estimate it was necessary to assume boundaries somewhere and to select a probable level for the storage surface, and accordingly the estimate figures apply to that level, whereas the actual developments would seek the cheaper lines offered by the execution of the works of Division IV. This handicap has been a constant one. In a scheme which is essentially one of gradual developments, which aims to secure economies through the assistance of natural causes judiciously directed, though the facts were recognized, it has not been found easy to give expression to them in casting up figures.

"As regards the barriers for storing coarse gravel, barrier No. 1 with its by-pass is an essential feature of the project of 1899, so styled. Yet, in view of the very considerable cost of the by-pass and its accessories, almost equaling the cost of the barrier part of the work, a serious question may be raised whether it might not be judicious to eliminate the by-pass feature and put more money into the dam. But in that case the principal motive for selecting this particular site falls away, and what is now styled barrier No. 2 should form the lower structure of the system. It is not open to question that more storage could be obtained for less money under this change of plan. Still, the personal bias of the writer leans to the present plan, believing it, though more costly, to be the more secure, and, in the long run, more liable to give satisfaction. The lowest barrier of the systhem, wherever it be located, has to make secure the ones above it, and it is a wide distinction whether over this important structure a 9-foot depth of water is to pass, or only one of 3½ feet.

"Division II has had no works planned for it, but has not been altogether overlooked. As barrier No. 1 is not expected to have any water flow over it except occasionally, and then only during brief periods, it would be practicable to foster growths of trees upon the whole division, clothing with vegetation that which is now a waste of shifting sands, but reserving a width of about 1500 feet to serve as an unobstructed waterway along the north shore. This would furnish an additional and inexpensive method of affording toe protection to barrier No. 1.

"The facilities for conducting operations are exceptionally good, the low-water season lasting usually eight months or more, and affording absolute freedom of action even in the river bed, while the parts of the work not in the river would be subject only to interruptions common to outdoor work. In this district the rainfall is light, snow and frost are absent, and cheap power is assured, for the line of the Yuba Electric Power Co. parallels the works at a distance of about 1 mile, and systems of ditches giving fair pressure exist on each side of the river, while fuel is cheap and abundant and everywhere at hand. But the most economical of all power sources might be an independent air compressing plant.

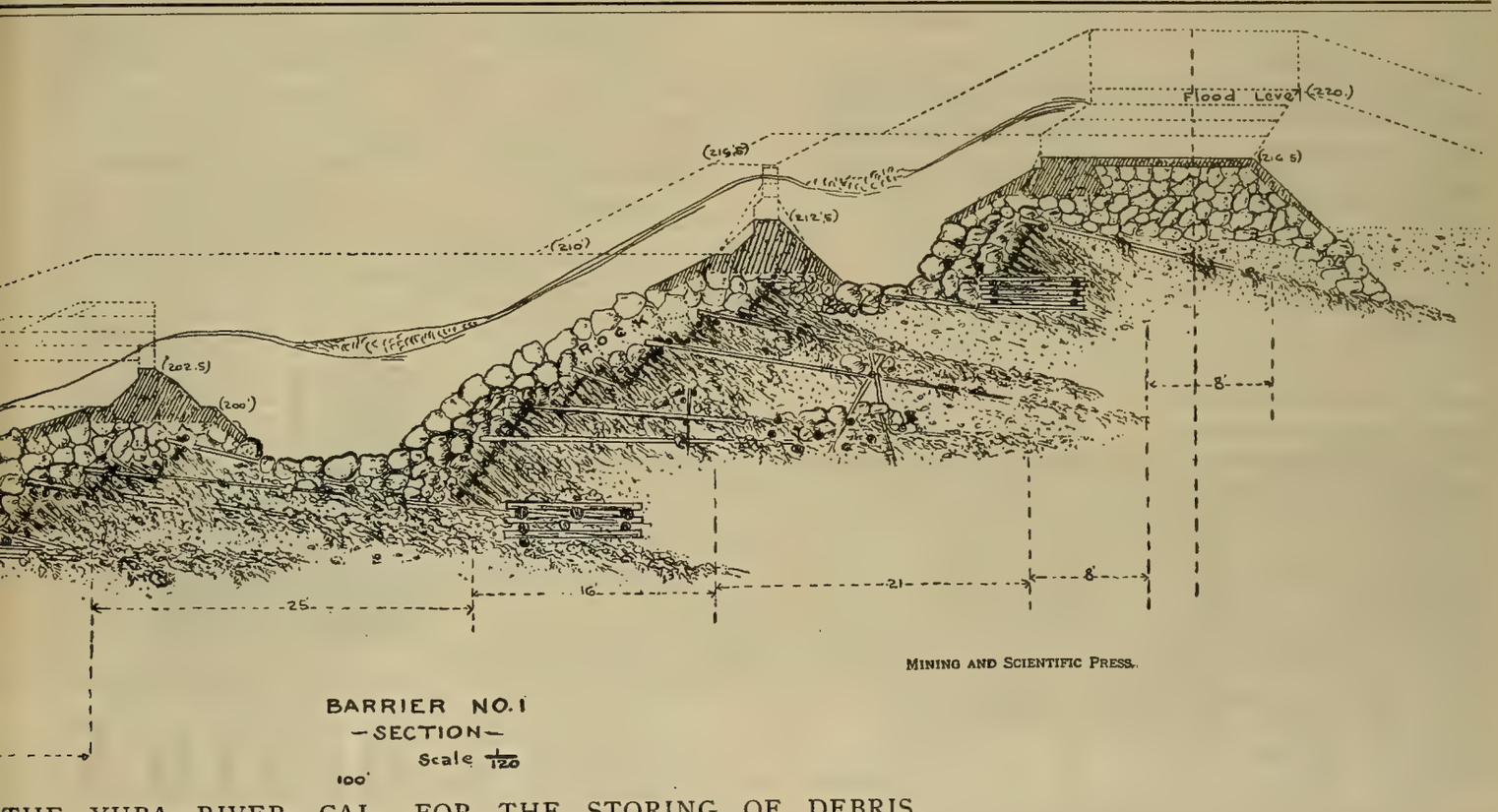
"Concerning the probable efficiency of the storage works, the successful operation of the settling basin involves a question of transporting solids by water. The security of the upper-river barriers implies that they shall be made to hold back cobbles, gravel, and coarser sand, but not any considerable amount of fine matter. The suspensory matter and silt and finer sands will probably not cause any difficulty in the basins, but there may perhaps exist an intermediate grade too fine to store above, too coarse not to cause difficulty below. It may be appropriate to state that should this prove to be the case the subject has not been overlooked, and is provided for, but it is expected that a classification into two grades may suffice. In concluding this report it may be permissible to enumerate the advantages which may be claimed for the project of 1899:

"It is a project of slow development; it does not expend any considerable amount of money in advance of results; it affords time to acquire experience as work progresses, and in no instance are structures so located as not to make alterations practicable. It husbands the interest account.

"It calls for no works of a daring or experimental type. There are few portions which, if constructed or partially completed, would not produce benefit and be separately operative, even if afterwards neglected, and it does not so store material that the conditions would be worse, should the structure be destroyed, than if they had never existed.

"It is remedial and benefical, creates lands but damages none, and aims to bring about order where there is now no order."

The Commission recommends, for the best interests of the service, that some of the work be done by contract, and that other portions be done by hired labor and purchases in open market.



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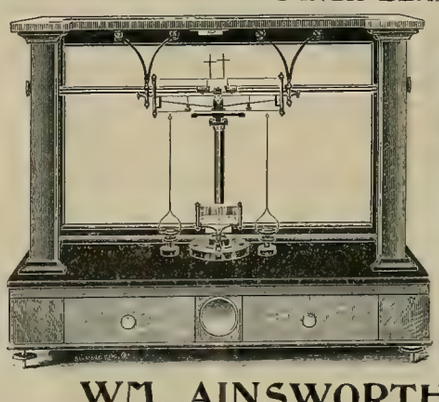
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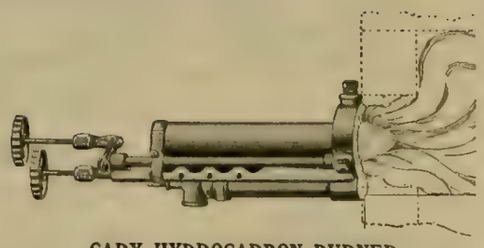
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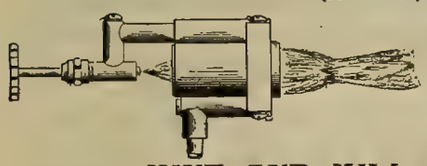
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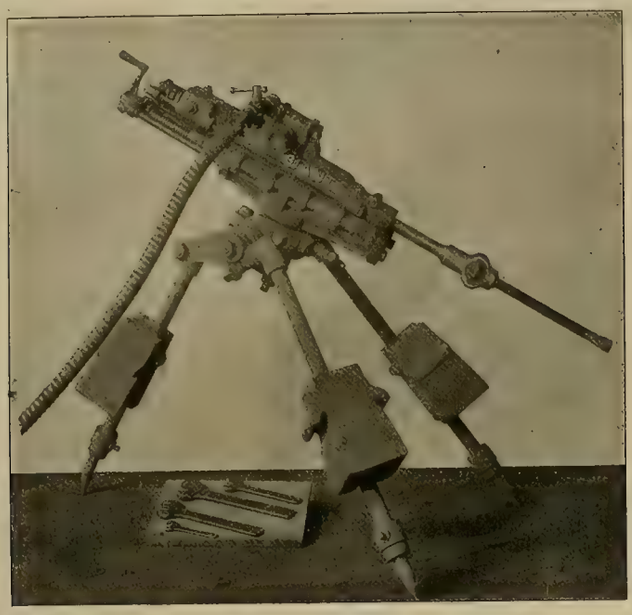
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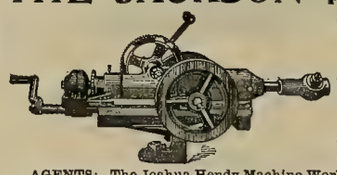
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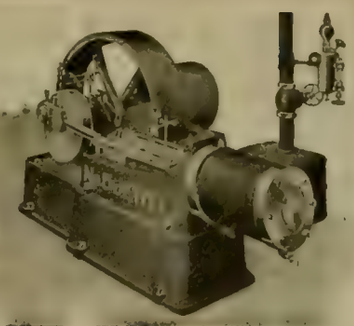
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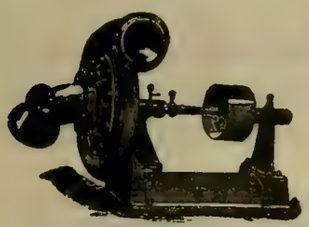


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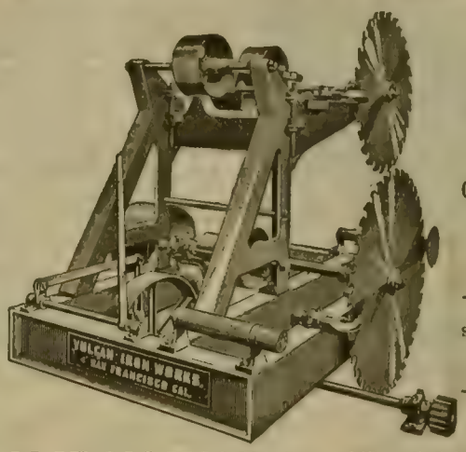
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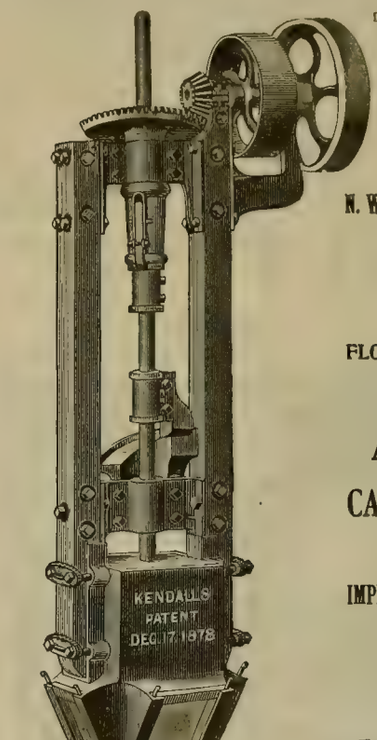
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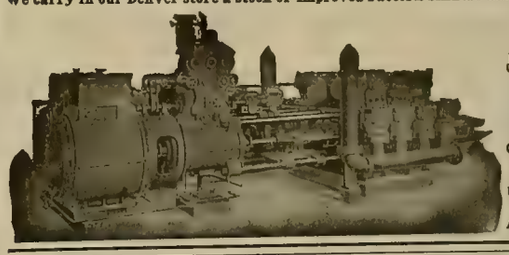
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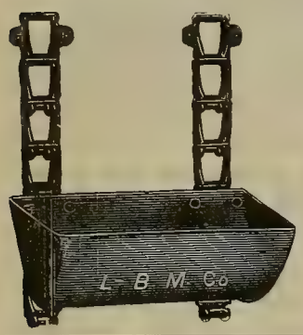


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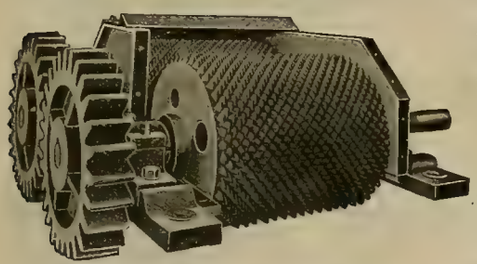
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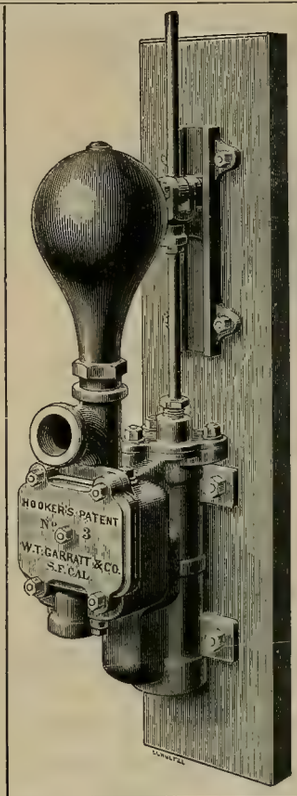
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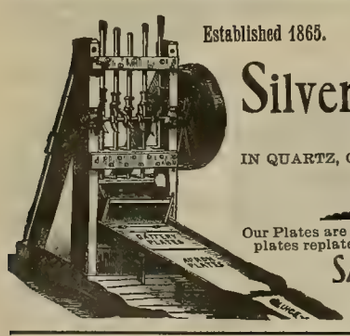
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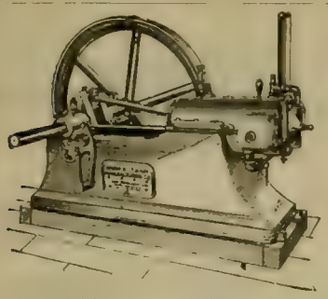
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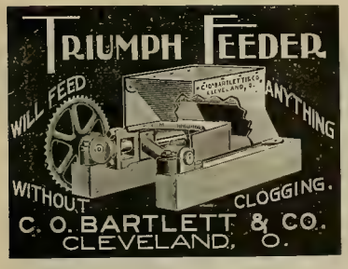


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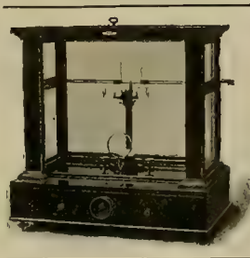
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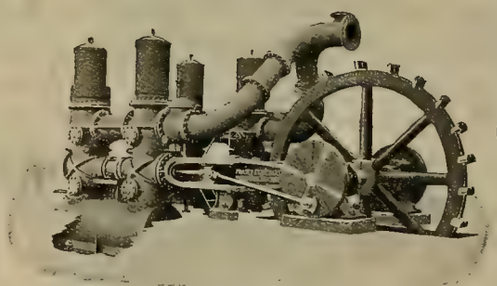
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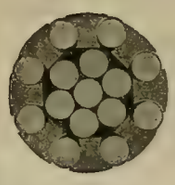

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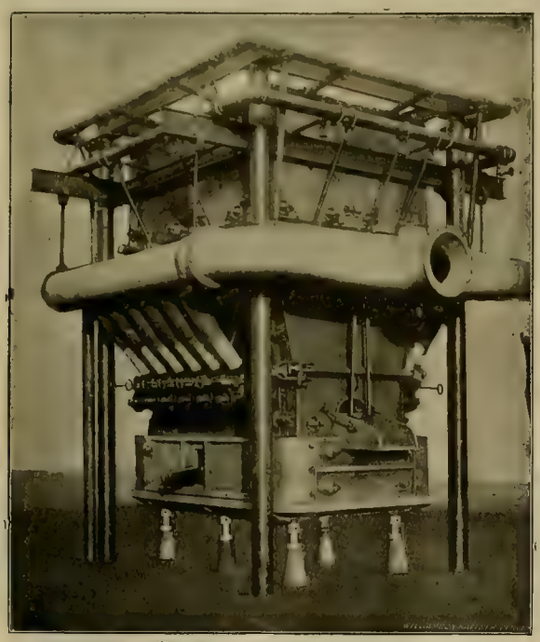
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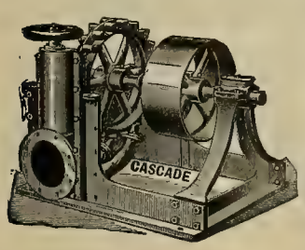
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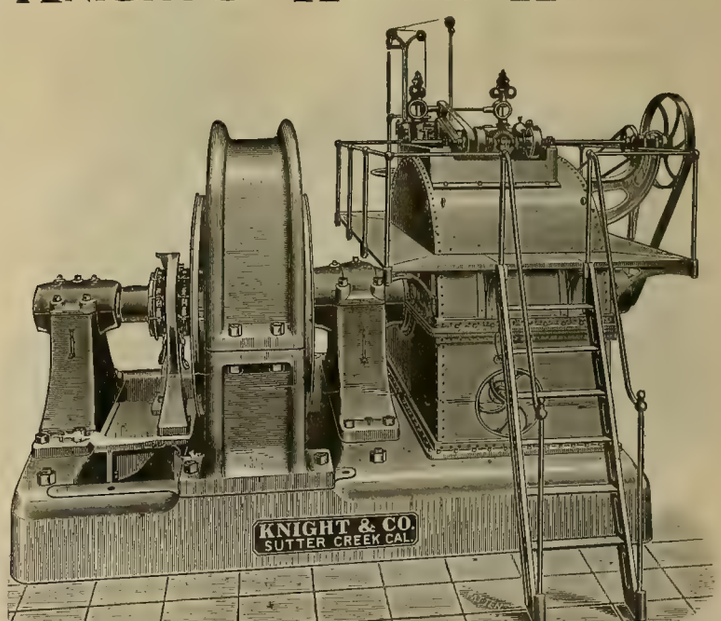
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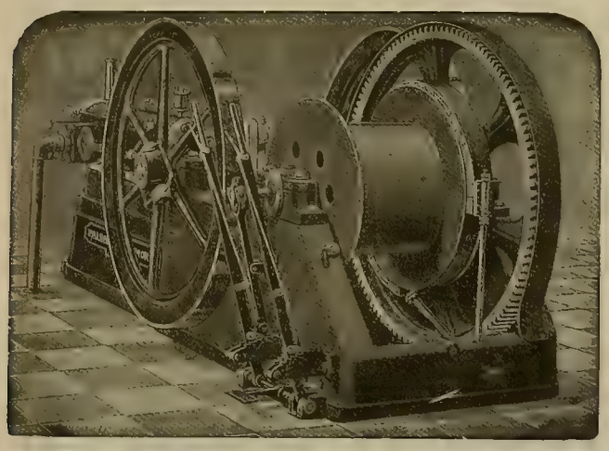
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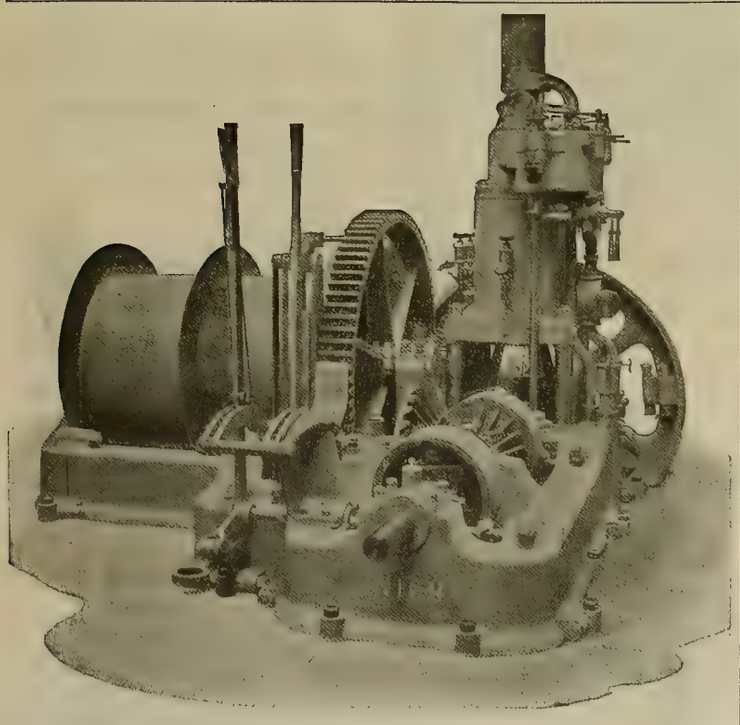
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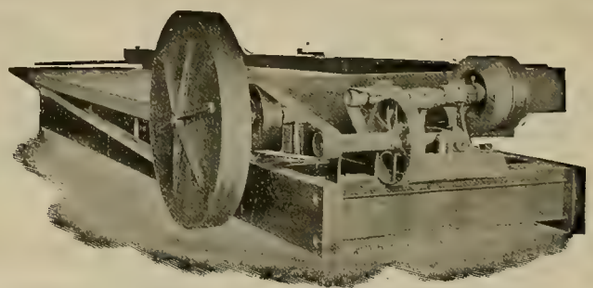
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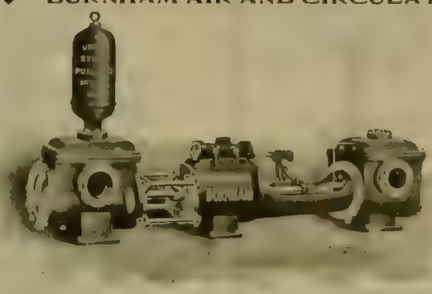
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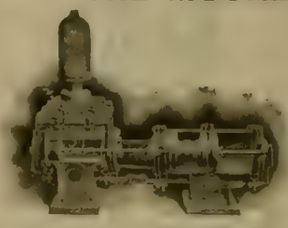


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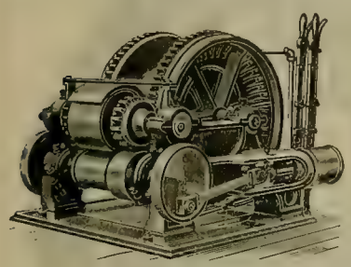
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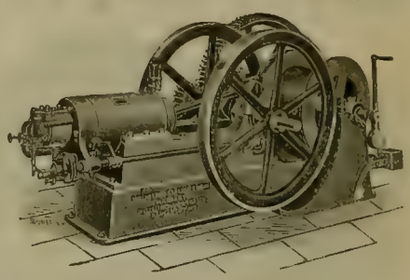
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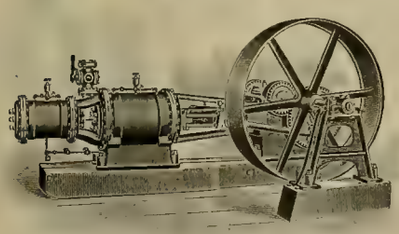
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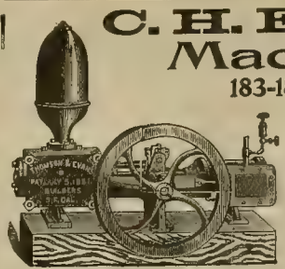
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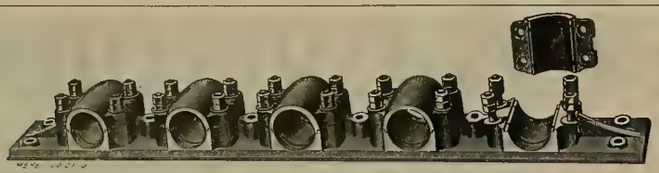
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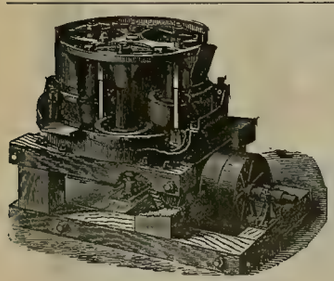
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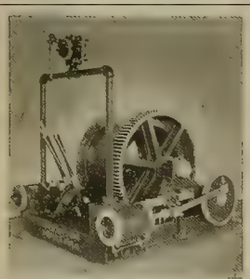
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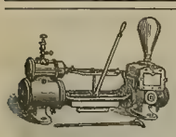
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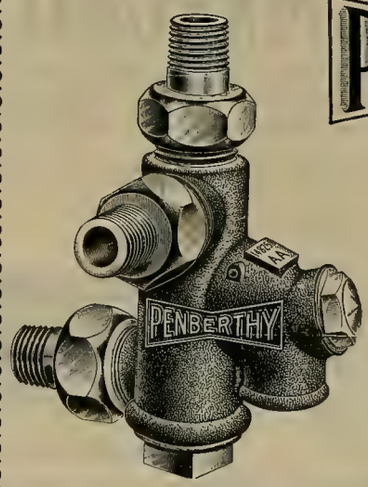
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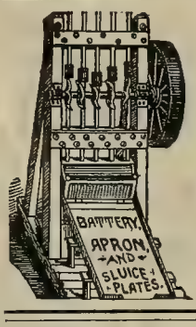
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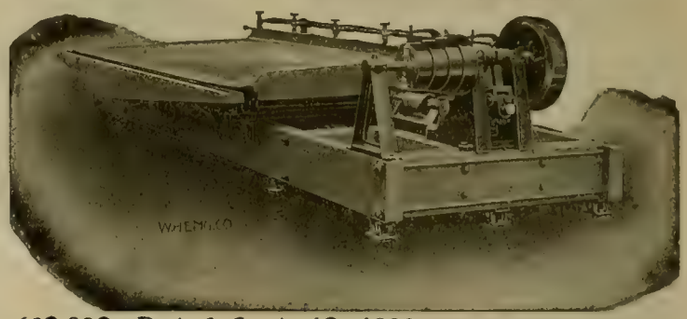
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MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of June, 1900, an assessment of seventeen and one-half (17½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of August, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of May, 1900, an assessment (No. 25) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 21st day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of May, 1900, an assessment (No. 3) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 310 Pine street, room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of July, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 30th day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. DREW, Secretary.

Office—310 Pine street, rooms 36, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of June, 1900, an assessment (No. 12) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of July, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of August, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

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ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 8th day of May, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Richard Rising	408	1,000	$100 00
W. H. Langford	628	500	50 00
Inman Sealby	614	2,900	290 00
Reese Llewellyn	414	200	20 00

And in accordance with law, and an order from the Board of Directors, made on the 8th day of May, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 213 Jackson street, San Francisco, California, on WEDNESDAY, the 11th day of July, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. MIDDLETON, Secretary.

Office—213 Jackson street, San Francisco, California.

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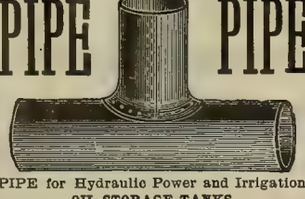
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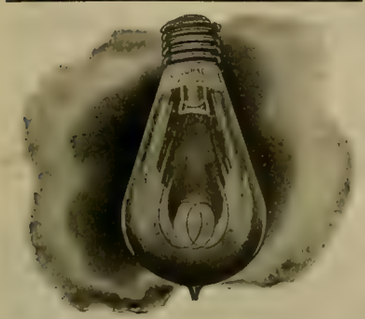


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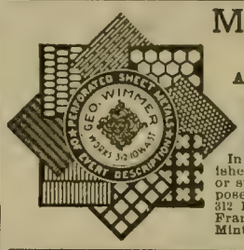
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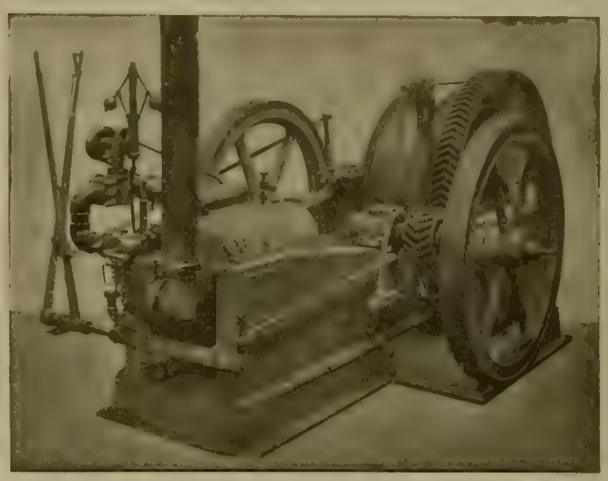


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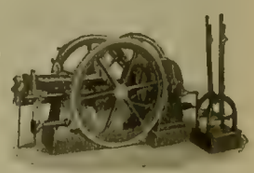
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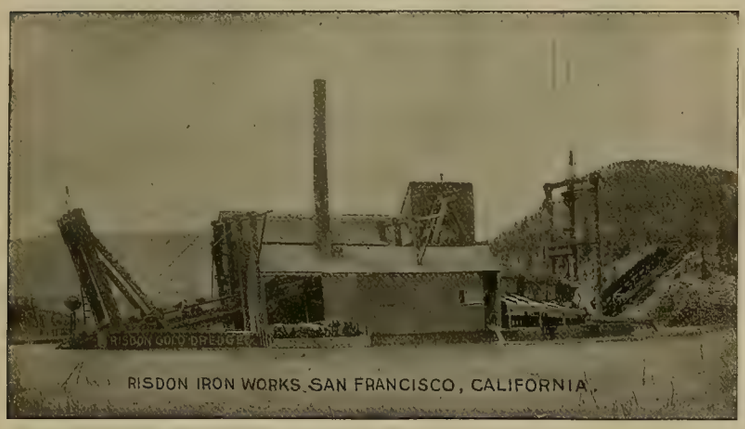
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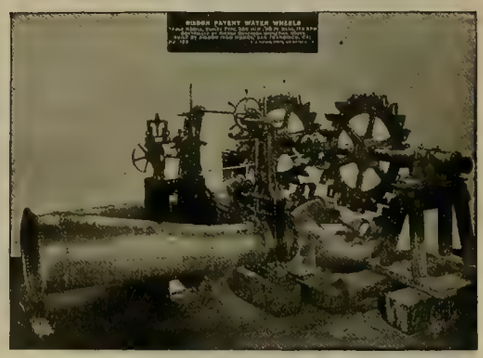
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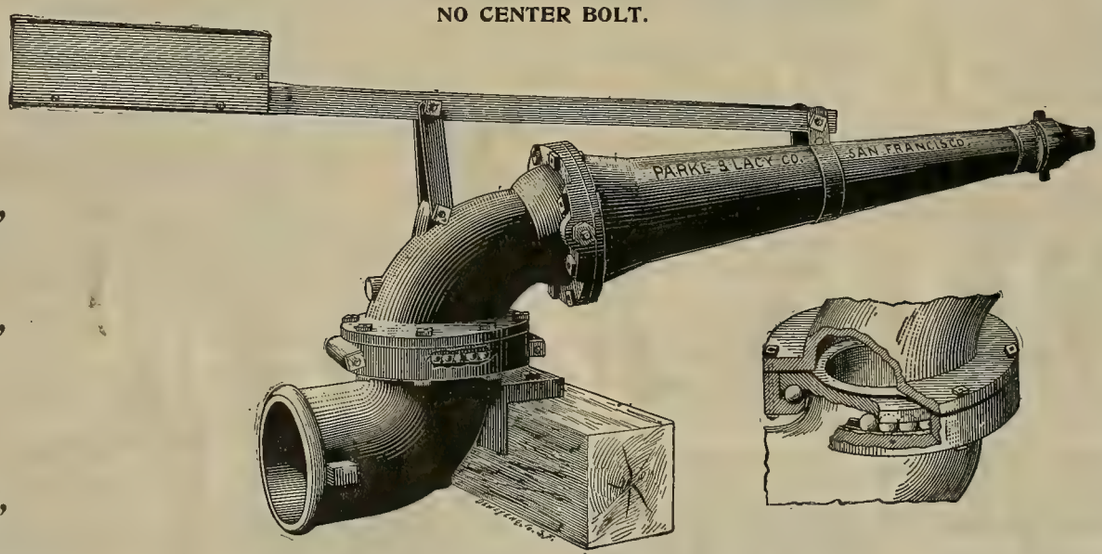
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MINING AND SCIENTIFIC PRESS.
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The Manufacture of Dynamites.

On this page last week appeared a technical description of the method of preparing explosive nitro-glycerine and dynamite. The subject is of sufficient interest to justify continuation. In addition to the dynamites with active absorbents mentioned are what is usually styled "dynamite No. 2," which consists of 18 parts of nitro-glycerine incorporated with 82 parts of a pulverized preparation composed of 71 parts of nitrate of potassium, 10 parts of charcoal and 1 part of purified paraffine, and lithofracteur, consisting of 55 parts of nitro-glycerine absorbed into 45 parts of a pulverized preparation consisting of 1 part of charcoal, 3½ parts of kieselgubr, 2½ parts of nitrate of barium and bicarbonate of sodium, and ½ part of sulphur and manganese. In consequence of the absorbents being active, lithofracteur is more powerful than dynamite No. 1; it is also slower in action. In mining operations it fissures the rock over a large area instead of smashing it within a restricted space. Carbo-dynamite consists of 90 parts of nitro-glycerine absorbed into 10 parts of charcoal made from cork. A high percentage of power is here developed, owing to the fact that 90% of nitro-glycerine is employed, while the absorbent itself is highly combustible. An important claim made for carbo-dynamite is that if it becomes wet exudation does not occur. By reducing the percentage of nitro-glycerine and replacing it by water, it is said that perfect absorption takes place, and that an explosive is produced that can be used with safety in the fiery mines. Carbo-dynamite does not appear to be extensively used. Among other dynamites of the active absorbent class may be mentioned dynamite No. 3, rhexite, meganite, carbonite, stonite, Hercules, Atlas, Vulcan, Judson, etc., there being over 100 different kinds.



Ore Yards at Sirena Mine, Looking Down Tramway from Purisima Tunnel, Through Assorting Ore Shed Toward Mill.



Santa Anna Stopes Below Main Tunnel, Between Soledad Incline and Camargo Workings.



Soledad Incline Shaft Following Vein Down on Its Dip from Main Tunnel (Purisima); Showing Cargadores Packing Ore.

Mining Scenes Near Guanajuato, Mexico. (See page 733.)

There is another class, called gelatine dynamites. Among these is blasting gelatine, which consists of a combination of nitro-glycerine and nitro-cotton. It is manufactured by dissolving finely divided nitro-cotton in nitro-glycerine so as to obtain a clear jelly, the usual proportions being about 8% of nitro-cellulose to 92% of nitro-glycerine, although 10% of the cotton is sometimes used. As nitro-glycerine contains an excess, and nitro-cotton a deficiency, of the oxygen necessary for the complete combustion of the carbon contained in them, the combination of the two in blasting gelatine balances the surplus in the one and the deficiency in the other. There are two varieties of blasting gelatine—No. 1 and No. 2, which is No. 1 with the addition of a nitrate. No. 1 is that generally in use. It is a gelatinous substance of the color of new honey, but varying in its consistency from a tough, leathery substance to one resembling a stiff jelly. The thinner the gelatine is the more sensitive it is to detonation, but at the same time it is also more liable to liquefaction than the tougher kind, and is thus likely to become a source of danger in transport and storage. Blasting gelatine requires specially strong detonators to explode it, and its detonative power can, as a rule, only be developed in confinement. Unlike dynamite, it is difficult to explode a train of it in the open, except by means of a powerful initial detonation. While dynamite and nitro-glycerine are less liable to explosion by a blow when frozen than when unfrozen, blasting gelatine follows a converse rule. It is less liable to freeze than dynamite, and is unaffected by water, an important advantage.

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San Francisco, June 30, 1900.

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Close of the 80th Volume.

This issue—No. 26—closes the 80th volume of this paper. Perhaps no one of its seventy-nine predecessors is richer in all that made them of value to the mining world than the one closing with this number. The index on pages 757, 758, 759 and 760 shows the multitude and variety of technical topics treated. Apart from the variety of valuable miscellany, is to be noted the number of original articles contributed by men in every department of mining and metallurgy. It is in order to cite a few: "Laccolites and Their Relation to Ore Deposits," by W. H. Storms of California; "Notes on Ore Dressing," by A. W. Warwick of Prescott, Arizona; "Construction of an Upraise," by F. Sletcher of California; "Quicksilver Recovery from Greasy Refuse," by D. B. Huntley of Idaho; "The Switzerland of Colorado," by T. A. Rickard of Colorado; "Bookkeeping for Mines," by S. I. Hallett of Colorado; "On the Concentration of Ores by the Use of Water," by Chas. Taylor of Arizona; "Dredging for Gold, by Theo. F. Van Wagenen of Idaho; "Gold Mining and Milling," by H. V. Croll of Montana; "Outcrops and Croppings," by J. P. Wallace of Oregon; "Treating Refractory Ore," by S. E. Bretherton of New Mexico; "Deadly Gas in Mines" by A. T. Heydon of California; "Cyaniding at El Dorado Canyon," by A. E. Vandercook of Nevada; "Iron Mines of Southern California," by C. H. Hubbs of California; "Masonry Dams and Retaining Walls," by G. T. Pardoe of Sussex, England; "A Door Closed to Miners," by A. H. Ricketts of California; "The California Copper Co." by F. F. Sharples; "Wet Crushing and Cyaniding the Siliceous Ores of the Black Hills," by Jno. M. Henton of South Dakota; "Testing Gold Dredging Ground," by R. M. Downie of Pennsylvania; "The California Oil Industry," by E. H. Rydall of California; "The Divining Rod," by David Kirkwood of British Columbia; "Successful Precipitations from Solutions Weak in Cyanide," by Matt W. Alderson of Montana; "Cheap Mining and Milling at the Spanish Mine," by H. F. Brown of Illinois; "Two Curious Lakes of Nevada," by H. W. Fairbanks of California; "Copper Mining at Placeritas de Nacosari, Sonora, Mexico," by H. B. Layton of Arizona; "Prospectors' Mistakes;" "Sinking vs. Tunnelling in Development Work," by J. M. Johnson of Washington; "Antimony in Austin, Nevada," by W. C. Gayhart of Nevada; "Use of the 'Baby' Air Drill," by H. P. Stow of California; "Mount Whitney, Cal., Electrical Transmission," by. H. G. Parsons of California; "Amalgamation of Metals, Normal and Electrolytic," by J. H. Jory of California; "Southern Oregon Placer Conditions," by Theo. F. Van Wagenen of Idaho; "Some Observations on Practice of the Cyanide Process at Mercur, Utah," by Wm. Magenau of Utah; "Cyanide Plant at Weaver, Arizona," by D. E. Bigelow of Arizona; "Small Mine Concentration," by S. I. Hallett of Colorado; "How to Make a Clinometer," by A. S. Cooper of California; "The Atlin Gold Fields," by J. H. Brownlee of British Columbia; "The Joplin Zinc District of Southwestern Missouri," by J. H. Steele of Colorado; "The 300-Stamp Mill on Douglas Island," by Henry Watson of Alaska; "Outlines of Structural Geology," by J. A. Edman of California; "Matte Smelting Plant at Campo Seco," by Edw. J. Fowler of California—these are among the many articles specially written for this paper during the past six months. From Alaska to Mexico; from the Missouri to the Pacific come practical articles from practical men.

This specialty of original articles is a feature. It is believed that this paper publishes each year a greater amount of original matter from men who are engaged practically in doing the things they write about than any other journal in the United States, and this is one of the reasons for its extraordinary popularity among mining men everywhere.

Patenting Mineral Lands.

The Secretary of the Interior Department sends notice of change in regulations governing the patenting of mineral lands. Every little while the Secretary of the Interior or the Commissioner of the General Land Office changes the interpretation to that time given the Revised Statutes of the United States applicable to mining, and, of course, every one concerned in these matters must know what these latest rulings are and act in accordance with them.

This time it is Section 2322, Revised Statutes of the United States. Following is the statute:

SEC. 2322. The locators of all mining locations heretofore made, or which shall hereafter be made, on any mineral vein, lode or ledge situated on the public domain, their heirs and assigns, where no adverse claims exists on the tenth day of May, eighteen hundred and seventy-two, so long as they comply with the laws of the United States and with State, Territorial and local regulations not in conflict with the laws of the United States governing their possessory title, shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their locations, and of all veins, lodes and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward vertically, although such veins, lodes or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side lines of such surface locations. But their right of possession to such outside parts of such veins or ledges shall be confined to such portions thereof as lie between vertical planes drawn downward as above described, through the end lines of their locations, so continued in their own direction that such planes will intersect such exterior parts of such veins or ledges. And nothing in this section shall authorize the locator or possessor of such a vein or lode which extends in its downward course beyond the vertical lines of his claim to enter upon the surface of a claim owned or possessed by another.

Some time ago the Commissioner and the Secretary ruled on that statute as follows:

1. The rights granted to locators under section 2322, Revised Statutes, are restricted to such locations on veins, lodes or ledges as may be situated on the public domain. In applications for lode claims where the survey conflicts with the survey or location lines of a prior valid lode claim, and the ground within the conflicting surveys is excluded, the applicant not only has no right to the excluded ground, but he has no right to that portion of any vein or lode the top or apex of which lies within such excluded ground, unless his location was prior to May 10, 1872. His right to the lode claimed terminates where the lode, on its onward course or strike, intersects the exterior boundary of such excluded ground and passes within it. The end line of his survey should not, therefore, be established beyond such intersection.

2. Where, however, the lode claim for which survey is being made was located prior to the conflicting claim, and such conflict is to be excluded, in order to include all ground not so excluded, the end line of the survey may be established within the conflicting lode claim, but the line must be run so as not to extend any farther into such conflicting claim than may be necessary to make such end line parallel to the other end line and at the same time embrace the ground so held and claimed. The useless practice in such cases of extending both the side lines of a survey into the conflicting claim, and establishing an end line wholly within it beyond a point necessary under the rule just stated, will be discontinued.

Now the Secretary of the Interior announces that paragraph numbered two of the above "is hereby abolished." It was law and proper procedure from the time the edict was issued, but now it is "abolished."

Paragraph numbered one in the above is amended by latest order of the Secretary so as to read as follows: "The rights granted to locators under section 2322, Revised Statutes, are restricted to such location on veins, lodes or ledges as may be situated on the public domain. In applications for patent on lode claims where the survey conflicts with the survey or location lines of another lode claim and the ground in such conflict is excluded, the applicant not only has no right to the excluded ground, but he has no right to that portion of any vein or lode the top or apex of which lies within such excluded ground, unless his location was prior to May 10, 1872. His right to the lode claimed terminates where the lode, in its onward course or strike, intersects the exterior boundary of such excluded ground and passes within it."

The former ruling was that the end center had to be located on unpatented ground; the new ruling permits the end center to be placed anywhere desirable, but an applicant for patent must exclude from his claim all portions that cover ground already patented. That is, the patentee of a later location has no right to any ores which might be found within the earlier location in all veins which apex ground already patented, but which may be covered by the latest location. Or, in other words, the statute itself is to be interpreted as it reads, and in the light of Supreme Court decisions, irrespective of former or recent opinions of executive functionaries.

No blame attaches to the Secretary or the Commissioner. They doubtless do the best they can with that ridiculous survival of ancient mystery known as "the United States mining law." Some time all this antiquated folly will be flung aside and the whole thing brought into line with modern requirement. Till then we can only announce what well-intentioned guessers in authority promulgate or rescind, according to their lights.

WHENEVER a barren, unproductive surface tract is proved by prospector and miner to be of value, it becomes fit subject for consideration of tax gatherers, and the basis of assessment is often an interesting one. In Cripple Creek, Colo., the Teller county assessor has decided to base the valuation on what is represented by the stock quotations. All sorts of schemes have been tried—taxing the gross product, the net product, the ground itself at an arbitrary value. Now comes the newest notion of making the selling price of the stock the basis of taxation. It will require a nimble assessor to keep track of some mining stocks in their gyrations. Just how he will value a property that is selling its stock one month at $3 and the next at 30 cents per share, is apparently undetermined by the new minded assessor. Nor is it clear how he will assess mining property where there is no stock. If he push his plan to its logical conclusion he will not assess any mine that does not issue stock. If such plan prevails, it will be unfashionable to issue mining stock.

A GENERATION AGO Michael Chevalier startled Europe with a prediction that an immediate glut of gold would demonetize that metal and demoralize then existing systems of finance. Some new Chevalier will doubtless be heard from before the close of the last six months of the century, prophesying that the present flood of gold will overwhelm everything in the world of economics. When Chevalier wrote the annual production of gold was $100,000,000. The gold product for 1900 is estimated to approximate $400,000,000.

THE first steel graving dam in the United States is to be built at the Salmon Trout river, Houghton county, Mich., by the Atlantic & Baltic Co. at their mill site. The steel part will be 475 feet. The dam will have an extreme height of 36 feet on a steel superstructure, which will slope back with the stream at an angle of 56°, forming the dam, which will rise 75 feet above the bed of the stream; walls of earthwork will make the entire length of the dam 1000 feet. The total storage capacity will be 600,000,000 gallons.

Concentrates.

COPPER can be precipitated from chloride solution with metallic iron.

GAS ENGINES of 250 H. P. are not uncommon; they are now built of 650 H. P.

NADORITE is a chlor-antimoniate of lead, sometimes found in connection with zinc carbonate, an uncommon mineral.

THE temperature of steam in steam pipes increases with pressure, and the amount of heat given off therefrom increases proportionately.

NOTHING definite was done by the last session of Congress regarding the California mineral land bill. The measure is just about where it was.

A CONCENTRATED SOLUTION of magnesium chloride should be suitable solvent for cuprous oxide; for cupric oxide try an aqueous solution of sulphurous anhydride.

WATERS injurious to boilers are mainly alkaline, or chalk, water; neutral, or gypsum, water; acid water. The first and second form scale, the last dissolves the plates.

A RHEOSTAT may either start or regulate the speed of a motor. Its function is to protect the armature coils from too much current while they are at rest or slowly turning.

WAVE MOTORS have been repeatedly illustrated and described herein. They work very nicely in an experimental way and have what is to some minds the charm of utter uselessness.

"AMORTIZATION" is a French term for a sinking fund, a mode of provision for contingent expenses in a mining company, as common in Europe as it is uncommon in the United States.

PHYSICAL chemistry may be defined as the science which has for its object the investigation of chemical changes by physical methods. Matter is anything that causes a direct excitement of our senses.

AN electric current cannot be sent through pure water, but the addition of a minute quantity of other matter reduces its resistance. Ordinary water admits of the passage of an electric current through it.

FROM the description of the quicksilver it is evidently fouled by babbit metal, and the only remedy is to retort it. Nitric acid treatment of dirty quicksilver is not relished by millmen, who do not care to be salivated.

IN electricity as applied to power and light for mining the great advantage is that while under former conditions the power had to be generated above where it was used, now it may be generated below the point of use.

THE statement regarding the plasticity of rock on page 639 in the issue of June 9th was scientifically correct. As with other rock, marble, even when dry, and at ordinary temperatures, can, under great pressure, be made to flow.

IN cyaniding an acid ore caustic soda will be found valuable as a neutralizer. Tests can alone determine the necessary amount, though two ounces per ton should be a fair average. About one-half pound each of cyanide and zinc is ordinary consumption.

REGARDING the requisite power to be used in electrolytic precipitation of copper one ampere hour of current should precipitate 1.75 grams copper with either soluble or insoluble anodes, which would merely occasion a slight difference in the required voltage.

THE piston speed of a 14x28-inch engine at 130 revolutions per minute is 66 feet 8 inches. The rule in such a case is to multiply stroke in inches by 2 and by number of revolutions per minute, and divide the product by 12; the quotient is the travel in feet per minute.

TO remove rust from steel immerse the article to be cleaned in a strong solution of cyanide of potassium, mix to the consistency of thick cream a paste of cyanide of potassium, castile soap, whitening and water, and after immersion brush the steel briskly, using the paste.

THE hand hammers used by riveters weigh 4 to 4½ pounds each, and the work done per blow is 58 to 65 foot-pounds per second, four blows being struck in five seconds. Smiths using a 5½-pound hammer strike one blow per second, and do work at the rate of 72 foot-pounds per second.

THERE are necessarily three nozzles in every injector, the actual number varying with the different makes. Those required in all are the steam nozzle through which the steam enters; the combining nozzle, where the steam and water are mixed; the discharge nozzle, through which the water is carried off.

A GRADUATE of a mining school or a competent mining engineer has a right to use the abbreviation "M. E." after his name, but there is no law on the subject. Nothing should be taken for granted, and any unknown claiming employment as an "M. E." should be obliged to give evidence of his right to the title.

THE Best Manufacturing Co., San Leandro, Cal., make a freighting wagon for use with their traction engines; the running gear is wholly of iron and steel, the bed is of wood, although it can be constructed of steel if desired; capacity sixteen tons; the tires are 16 inches wide, ⅝ inch thick; the front axle is a little longer than the rear one, so that the front wheels lap on the track of the drive wheels of the engine about one-half the width of the inner edge; the rear wheels lap about one-third the width of the front ones on the inner edge, thus rolling the road smooth.

A DYNAMO doubtless works better at a low temperature than a high one, as the former keeps the iron cores and copper conducting wires cool, securing greater conductivity. The temperature coefficient of copper is 0.002 per degree F., so that in certain limits copper improves two-tenths per cent for each degree it is cooled.

THE oil wealth of California is incalculable and is being rapidly developed, but care is necessary in investments in stock companies. There are many incorporations offering worthless stock for sale, and investigation before purchasing is essential. In a general way it may be considered unwise to buy stock in any corporation not owning oil land with good title thereto.

ANYTHING of interest to readers of this paper is always welcomed, and where accompanied by photographs, sketches or drawings, such illustrations are carefully engraved for embellishment of the article. "Everybody is wiser than anybody," and every reader certainly has something to contribute of common profit and value to all.

A GOOD CEMENT for leather belting is made by working together ten parts bisulphide of carbon, one part oil of turpentine with gutta-percha, forming a thick paste. The leather where the cement is to go should be unrolled and roughed, and when the cement is put on the ends should be pressed together closely till the cement has well dried.

THE methods employed by the Little Tiger M. Co., Shasta Co., or the Alder Gulch M. Co., Tuolumne Co., Cal., are not such as are usually considered conducive to mutually satisfactory results, but there is no law in Massachusetts or Iowa any more than in California to restrain the credulous or prevent the unwise separation by any man from his money.

WEEKLY REPORTS of authentic mining dividends are given as a matter of news. There is no "charge" therefor, any more than there would be for any other news or information. Announcements of dividends declared are always gladly given publicity. It is impossible to give anything like a full list, as many mining companies make no returns of dividends paid.

HARD-DRAWN COPPER WIRE is largely used in all electrical industries. While retaining properties of conductivity inherent in copper, it has the additional quality of great tensile strength. It aids in long distance telephony and the electrical transmission of energy. The annual consumption of hard-drawn copper wire in the United States exceeds 80,000,000 pounds.

THE central wire in the three-wire system is nominally neutral. The lamps are placed in multiple arc between the two outer conductors and the neutral wire, and are so distributed that the current is the same in both. While this balance is maintained no current flows through the neutral wire, but if it becomes greater in one than in the other the surplus is taken care of by the neutral wire.

IN the case of the St. Louis M. & M. Co. vs. Montana M. Co., 19 S. C. R., 61, the Supreme Court of the United States decided that neither the statute nor public policy renders invalid a contract made in settlement of litigation over a disputed boundary between mining claims, by which one of the claimants binds himself, on obtaining title from the United States, to convey the portion in dispute to the other.

GRAPHITE is reported found in various localities in California, Wyoming, South Dakota and Utah, but the principal source in the United States of the natural product is Ticonderoga, N. Y., where about 1,000,000 pounds are annually produced. An artificial graphite is manufactured in this country from coke, which in some respects is said to be capable of successful competition in price and quality with the natural product.

THE engines of battleship Wisconsin, building by the Union Iron Works of San Francisco, were illustrated and described in the issue of April 29, 1899. The vessel embodies all the electrical features that have been experimentally tried in the older vessels. Her electrical equipment consists of an incandescent lighting system, four large searchlights, apparatus for the operation of the two large turrets, electrical ammunition hoists and powerful electrically propelled fans for the elaborate ventilating system.

IT may be that the late Capt. Thos. Mein made $300,000 in a few years because of his mine knowledge. If he did it was no more than he was worth. Such a sum is not without precedent. Wm. Patton got $60,000 per annum on the Comstock, and there are men living who make $50,000 annually as consulting engineers or mine managers. A big mine might find it true economy to pay the right man $40,000 or $50,000 a year—truer economy than to get an incapable man for nothing. It's all in the mine—and the man.

OF this issue there are printed and circulated 11,284 copies. It is the last issue of Vol. LXXX. It is the 2084th issue of the paper. Next Saturday's issue will be No. 2085, being Number I of Vol. LXXXI, the 41st year of the paper's existence. On the last four pages of this issue appears an index which gives some idea of what was published in our columns during the past six months. A great many are pleased to say that they find enough in any one issue to pay them for what the entire year costs. The contents of two such volumes every twelve months published in technical book form would cost several hundred dollars. The two volumes as published week by week are furnished postpaid for three dollars. If every one who reads his neighbor's copy were to send his name and have the paper come to him individually, the number of subscribers would be over 50,000. In thousands of instances the paper, after being read and passed around, is remailed to be again read and reread in other localities. It were better to save and bind the copies, for in no other way can so much matter of value to the mining world be collected in so cheap and permanent a form.

THE difference between true and apparent level is occasioned by the curvature of the earth and refraction. The correction for curvature is equal to the square of the distance sighted, divided by the mean diameter of the earth—7912 miles. In one mile—5280 feet—the correction for curvature would thus be 8.0076 inches. More accurate data require that the correction for refraction shall also be taken into account, and is to be deducted from the correction for curvature. For a distance of one mile the correction for refraction is 1.1436 inches; hence 8.0076 — 1.1436, or 6.864 inches is the true correction for that distance. For any considerable distance the true correction for curvature and refraction may be had by using the following formula, in which "C" is the true correction in feet, "D" the horizontal distance in miles: $C = \frac{D^2}{1.75}$.

THERE are several rules by which to calculate the volume of water a given sized pipe line with a given fall will furnish, and, for one who knows how much water he requires, to determine the size of pipe required. To answer both questions the following formulas will suffice: For velocity in second-feet for rough pipe, V = velocity, D = diameter of pipe in feet and H = the fall in feet per 1000 feet — $V = \sqrt{D \times H \times 1.5}$. To find the quantity delivered by a pipe line use this formula: $Q = D^2 \times \sqrt{D \times H}$, Q = quantity in U. S. gallons per minute, D = diameter of pipe in inches, and H = fall in feet per 1000 feet. By transposition in the last formula $D^6 = \frac{Q^2}{H}$; that is, that knowing the quantity desired in gallons, and the fall from the proposed head of pipe line to point of delivery, the diameter in inches of required pipe can be found by dividing the square of the quantity by the fall in feet per 1000 feet, and extracting the fifth root of the quotient.

TO ILLUSTRATE the matter of efficiency as compared with first cost in power transmission equipment may be taken the suppositious case of a manufacturing plant where 500 H. P. must be delivered to machines at various distances up to 400 feet from the engine. Taking the efficiency of belts and shafting at 50%, the power delivered by the engine would be 500 ÷ 50% = 1000 H. P. With electric equipment of 70% efficiency the power delivered by the engine would be 500 ÷ 70% = 714 H. P. The engine and boiler for the use of belts and shafting would therefore be of 40% greater capacity than for the electric equipment. The increased cost of engines and boilers for this 284 H. P. increased capacity required with the belts and shafting would be, say, $7000. Belts and shafting for this plant could be made to cost $15,000, which with the $7000 above makes a total of $22,000 to be compared with the cost of electric equipment. Electric generators and motors to deliver the 500 H. P. to machines, together with the necessary wiring and fixtures, if figured at $50,000, would show an excess of $28,000 over the purely mechanical equipment. To offset this $28,000 greater first cost there would be an annual saving of 1000 — 714 = 286 H. P. The value of 286 H. P. per year at $40 per H. P. is $11,440 yearly, or enough to repay the $28,000 increase in first cost of plant in less than three years.

IT is an extravagance to run an engine on a light load, for engine losses are nearly constant, and for light loads become a large percentage of the total. In the majority of small plants, the engines are run for many hours at a light load, but the remedy can only be suggested when all the factors in each individual case are stated. In selecting an engine, if for a variable load, it were well not to get the engine cylinder too large—only large enough for the maximum work it may be called upon to do, and not to get the other parts too small. In the delivery of the steam to the engine many troubles may come up. The steam may start wet and at too low a pressure and become more moist and reduced in pressure before it reaches the engine, or fail to maintain pressure to the point of valve closure, exhaust at too high a terminal pressure, or have too much back pressure. Improvements might be made in many instances by using larger pipe with long bends, steam separators, or by using steam reservoirs close to the engine, well-covered pipe, free exhaust and an efficient feed-water heater. The economical requirements in the production of steam are sufficiently strong boilers, with good circulation, kept clean inside, tight settings, sufficient draft for rapid combustion, grate areas properly proportioned to the output of the boiler and to the coal to be used, feed-water as hot as possible and free from oil, and coal with the greatest number of heat units per dollar of cost in the furnace. The question of coal is one which requires attention as to whether it is positive or negative economy. It may be that a cheap coal is evaporating less water per dollar than a more expensive one, or changes in the furnace might reverse the case, making the cheaper coal a positive economy. In distributing electric energy for incandescent lighting, constant pressure is an important item. It is a common error to maintain a constant voltage at the station, regardless of the varying load.



Cross-Section of Lode in the Valenciana Mine.



Guanajuato, Showing Position of Company's Mill; Tramway Winding Around Sirena Mountain on Right; Also Old Patio or Hacienda de Beneficio in the Foreground.



Purisima Tunnel of Sirena Mine, 5000 Feet Long; Taps Vein at a Depth of 1000 Feet.



Guanajuato Con. Mining & Milling Company's Combination Gold and Silver Mill, in Hacienda de San Francisco

Mining Scenes Near Guanajuato, Mexico.—(See Opposite Page).

A Guanajuato, Mexico, Mining Enterprise.

About 250 miles north of the City of Mexico, State of Guanajuato, is a noted mine—the Sirena, the property of the Guanajuato Consolidated Mining & Milling Co., in the Veta Madre (mother lode) region, worked continuously since 1554. Ancient Mexican mining methods were on vastly different lines than those of to-day. On the Valenciana mine was sunk an octagon-shaped shaft, 36 feet in diameter; on the Rayas one 40 feet in diameter. These shafts cost upward of $1,000,000 each, the lode being in places opened to a vertical depth of nearly 2000 feet, or 3000 feet on the dip of the lode. The lode courses N. W. and S. E., dipping 43° S. W., a fissure following mainly the structural strike and dip of the enclosing country rock. On the opposite page is a view of a cross-section of the Veta Madre in the Valenciana mine, showing a split or division in three distinct ore-carrying veins, the cuerpo de alto or hanging wall, de en medio or middle, and de bajo or footwall ore chimneys or branches; the ore body of the hanging wall considered the lode proper, the center and footwall deposits, spurs of the main vein. The rock locally termed "lozero" is a peculiar feldspathic variety of fine-grained stratified conglomerate; from the Valenciana southeasterly toward the Sirena the lode passes between slate, siliceous slate appearing in the latter in both walls. In the Veta Madre ore are silver glance, ruby silver, gray copper, galena and blende, with copper and iron pyrites in a siliceous gangue, rich, productive zones alternating with barren sections.

At the close of the eighteenth century Valenciana ore averaged 112 ozs. silver to the ton; in the early part of the nineteenth century it carried about 85 ozs.; from 1860 to 1865 it went about 50 ozs.; it now goes from 15 to 50 ozs. Humboldt, who visited the mine about 1822, thought the richest zone would be between the altitude of 6000 and 7000 feet, the subsequent developments not wholly confirming this theory. The most profitable of the Veta Madre ore bodies was stoped out from 1770 to 1800 in the Valenciana; the thickness of the lode was 492 feet; in the Mellado mine the lode developed a width of 300 feet, containing solid ore bodies that measured 200 feet from wall to wall, worked to a depth of 1450 feet. These workings communicated with the Rayas, in which, like the Comstock bonanza, the ore yielded largely in gold. The tiro general, or main working shaft of the Rayas, is about 40 feet in diameter and 1900 feet vertical depth—a unique excavation. The Rayas mine is shown by its books to have paid the King of Spain in royalties over $17,000,000. It is estimated that the total production of the mines mentioned aggregated $862,000,000 from 1590 to 1886.

While from a modern standpoint unwatering the Veta Madre mines would be a simple problem, yet in olden times, as the workings expanded longitudinally and in depth, the high lift and increasing drainage area made the problem a formidable one for the ancient methods according to the standards of serious mining undertakings then ruling. When the "holding of the water" by the use of hide bags, buckets and hand pumps had been interrupted for any considerable period, owing to political or other disturbances, vast volumes of water accumulated in the many miles of extended workings and wide yawning stopes; thereupon, its removal involved, as it were, the draining of a chain of subterranean pools and lakes and became indeed a serious affair. Hence, it finally came to pass that the submerged condition became general throughout the lower levels of the bonanza mines, thus limiting and confining exploitations to the upper workings, viz: from 500 to 1000 feet from the surface, or less than one-half their total depths. This has narrowed down much of the present work to the extraction of the lean ores, remaining as filling and low-grade blocks after the exploitation of the richer deposits in former times.

Various projects for unwatering the Veta Madre mines by projected tunnels and large-scale pumping plants situated at central shafts have been proposed from time to time; and as far back as Humboldt's inspection he recommended the driving of a deep tunnel from Silao, measuring 12 miles, to the mines. Upon the completion of the railway from Silao to Marfil, and from the latter place to Guanajuato, discussions of the tunnel and other projects to reopen these historic mines took on new vigor. The poor saving in gold values that attended the old methods of extraction had also attracted attention to economic possibilities by modern systems of treatment; the only undertaking of recent date to reconstruct any of the more prominent properties is that which the Guanajuato Con. Mining & Milling Co. has in hand, after over two years of work in unwatering its Sirena mine.

At the present time the higher grade ores are shipped from the district and sold for cash to the smelting works of the United States and Mexico—those of the Guggenheim Company at Auguascalientes on the Mexican Central Railroad, about 140 miles from Guanajuato, being the nearest. Ores running over $40 (Mexican) per ton, silver value, are usually shipped out of the district to the smelters; some ores of this class also carry gold. There are also smelters purchasing Mexican ores at San Luis de Potosi and Monterey, Mexico, and at El Paso, Texas—since the establishment of which but a small tonnage of crude ore is exported to Europe. The lower grades make up the great bulk of the product, however, and are worked locally by the ancient patio process in some of the thirty-five or forty reduction works of this type in and about Guanajuato. An inventory taken not many years since showed the aggregate haciendas to contain 60 Chilian mills, 300 large arrastras and nearly 1000 of smaller size; besides hundreds of horses and mules, the plants also included over thirty steam engines, representing 1000 H. P.

The patio plants of the Guanajuato industry are often owned or controlled by others than the mine owners and operated separately from and frequently antagonistic to the interests of the latter on a custom basis of high charges in favor of the hacienda. It is not of infrequent occurrence for the majority shareholders in a mining property to acquire a hacienda and shrewdly operate it on the profitable contract basis of the high treatment charges, somewhat after the former fashion of milling on the Comstock, Nevada; the mine may run behind, but the hacienda does a thriving business—inuring to the benefit, in such cases, of the majority mine owners, who make their profits through the hacienda, while the minority mine stockholders, being non-participants in the hacienda profits, have heaped upon them the unprofitable or mining side of the venture. The debts being, as a rule, carried as a charge against the mine's output, and not, so to speak, as a foreclosure lien against the property itself, the operation may run for a series of years with an ever-increasing debt against the mine, while the working of the latter is supported and encouraged by those in control of the patio. The treatment charge, called maquila, is fixed from time to time by more or less extended contracts. In 1862 and 1863 it was about $28 per monton, or about $18 per ton; even now the charge is not far below this figure, besides which extra expenses are added for loss in quicksilver and cost of transportation from mine to works, and sometimes a still further allowance is made in favor of the hacienda for excessive consumption of salt beyond a stipulated normal quantity, which latter varies from 50 to 100 pounds per ton of ore treated.

The patio process extracts about 90% of the silver and from 30% to 35% of the gold contents in the ores; the whole treatment of the ore takes from three to six weeks—longer in winter than in summer time—which is one of the chief drawbacks from an American view point. From the bullion produced the Government taxes of from 5% to 7% are also deducted before a return is accounted for to the mine. The haciendas, therefore, work as a rule on a sure basis of profit, while the mining enterprises proper have to pay a profit to these customs establishments, the miner rarely enjoying the benefit of having his ores treated at actual cost by the mine's own plant, operating exclusively in its interest. The Guanajuato Con. Mining & Milling Company owns its own mill of modern design, (see engraving on opposite page), operated exclusively in the interest of its own properties, and thus escapes this customary tax, which in effect is a forfeiture of part of the mining profit.

The transportation of the ores from the various mines to the haciendas is done entirely on the backs of mules, requiring therefor great numbers of animals, which, with their heavily laden rawhide sacks, often block the narrow streets so as to render them almost impassable. An exception to this method of transportation, and the only one in Guanajuato, is the plant illustrated, which also includes the connecting of the Sirena mine with its new combination gold and silver mill of the M. B. Boss type by a surface tramroad 3520 feet long.

(TO BE CONTINUED.)

Outlines of Structural Geology.

NUMBER III.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by J. A. EDMAN.

SECOND STAGE — CONSOLIDATION AND METAMORPHISM.—During and after the subsidence of the strata thus formed, and when gradually exposed to increasing heat and pressure, the presence of the original moisture accelerates chemical activity, and new mineral combinations would form within the various strata, organic matter when present causing a continued deposition of metallic sulphides through the mass, the formation of various silicates and the gelatinization of the silica when abundant in minute division. Most of the amorphous acidic rocks would become plastic, and when earth movements occurred, occasioning faulting and folding, with fissuring and crushing of the harder strata, the most plastic portions of the rocks would move toward the open spaces, while the still more mobile silica would carry with it much of the sulphides in suspension and solution.

Under the conditions then prevailing the fissures caused by dynamic action would be filled largely by the silica exuding through the pores of the rock, and also by other silicates, and the crushed rock fragments would be recemented. Beds of gravel, and even conglomerates, have under such stress and movements lost their physical features and become homogeneous; tuffs have been consolidated into greenstones and fossiliferous limestones been transformed into crystalline marbles. Superheated steam would form and exert active influence on these processes, but it is not probable that any bodies of hot circulating water from below could exist at great depths, the best evidence of which is that the deeper-seated fissures forming at this and subsequent stages carried, not hot solutions, but mineral matter in fusion. Hot waters may, however, have been active, but they would be derived from the percolation of surface water into open fissures reaching to considerable depths, and such waters, as well as those of lower temperature, may have carried silica as well as metallic salts into fissures, there to be precipitated and solidified.

A definition of the term "secondary quartz or silica," often used, seems necessary. The term refers to quartz or silica formed subsequent to and within an enclosing rock of whatever nature. Its general formation results from exudation or infiltration of silica from surrounding rock, or from a soluble rock being replaced by silica, which takes place precisely in the same manner as when a buried tree is petrified.

The term "vein quartz" is a misnomer. What is so called is simply silica which is nearly pure and has crystallized slowly. It is found under all conditions and everywhere among the metamorphic rocks, while hornstone, or flinty silica, also forms the gangue of many metalliferous deposits.

Not only the sedimentary beds, but the igneous masses alternating with them, would partake of the general metamorphism, but the latter in different manner and degree, chiefly owing to the fact that they carried less free silica than the sedimentaries.

In most instances metamorphism would obliterate all fossils in the sedimentary rocks and their ore deposits, specially through the crystallization of the limestones, and only rare instances would occur in which stratification previous to or during the first stages of subsidence had rendered the fossils resistant to physical and chemical forces, and thus in condition to be ultimately recognized.

Under the conditions affecting the strata during the second stage, a concentration of metalliferous minerals would occur in many sedimentary beds and

Table of Dimensions and Resistances of Pure Copper Wire.

		Area.		Weight and Length, Sp. Gr., 8, 9.			Resistance at 75° F.		
American Gauge B.&S.,No.	Diam., Mils.	Circular Mils. (d_2) 1 mil.=.001 in.	Sq. Inches. (d_2 x .7854)	Lbs. Per 1000 Ft.	Lbs. Per Mile.	Feet Per Pound.	R. Ohms Per 1000 Ft.	Feet Per Ohm.	Ohms Per Pound.
0000	469.000	211,600.00	166,190	639.33	3,375.7	1.56	.04906	20,383	.000076736
000	409.640	167,805.00	131,790	507.01	2,677.0	1.97	.06186	16,165	.00012039
00	364.800	133,079.40	104,520	402.09	2,133.0	2.49	.07801	12,820	.00019423
0	324.950	105,592.50	82,932	319.04	1,684.5	3.13	.09831	10,409	.00030772
1	289.300	83,694.20	65,733	252.88	1,335.2	3.95	.12404	8,062.3	.00048994
2	257.630	66,373.00	52,130	200.54	1,058.8	4.99	.15640	6,393.7	.00078045
3	229.420	52,634.00	41,339	159.03	839.68	6.29	.19723	5,070.2	.0012406
4	204.310	41,742.00	32,784	126.12	665.91	7.93	.24869	4,021.0	.0019721
5	181.940	33,102.00	25,998	100.01	528.05	10.00	.31361	3,188.7	.0031361
6	162.020	26,250.50	20,617	79.32	418.81	12.61	.39546	2,528.7	.0049868
7	144.280	20,816.00	16,349	62.90	332.11	15.90	.49871	2,005.2	.0079294
8	128.490	16,509.00	12,966	49.88	263.37	20.05	.62881	1,509.3	.012608
9	114.430	13,094.00	10,284	39.56	208.88	25.28	.79281	1,261.3	.020042
10	101.890	10,381.00	8,153.2	31.77	165.63	31.38	1.	1,000.0	.031380
11	90.742	8,234.00	6,467.0	24.88	137.37	40.20	1.2607	793.18	.050682
12	80.808	6,529.90	5,128.6	19.73	104.18	50.69	1.5898	629.02	.080585
13	71.961	5,178.40	4,067.1	15.65	82.632	63.91	2.0047	498.83	.12841
14	64.084	4,106.80	3,146.9	12.41	65.525	80.59	2.5908	385.97	.20880
15	57.068	3,256.7	2,557.8	9.84	51.956	101.63	3.1150	321.02	.31658
16	50.820	2,582.9	2,028.6	7.81	41.237	128.14	4.0191	248.81	.51501
17	45.257	2,048.2	1,608.6	6.19	32.683	161.59	5.0683	197.30	.81900
18	40.303	1,624.3	1,275.7	4.91	25.925	203.76	6.3911	156.47	1.3023
19	35.390	1,252.4	983.64	3.78	20.051	264.26	8.2889	120.04	2.1904
20	31.961	1,021.5	802.28	3.09	16.315	324.00	10.163	98.401	3.2926

The Electric Furnace.

The electric furnace is passing out of the experimental stage, and is meeting with practical success. There are several distinct types, in one of which the intent is to control the position of the arc between electrodes by placing it in a magnetic field. In a furnace illustrated herewith the arc is made to traverse to and fro at right angles to the direction of the current. This is shown in Figs. 1 and 2, the first indicating the application of the principle, the second giving a cross-sectional view of a traversing multiple arc furnace. Referring to Fig. 1, C^1 and

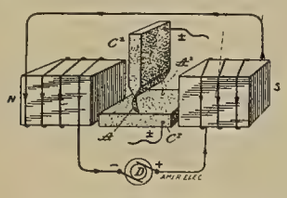


Fig. 1.—Magnetic Control of Arc.

C^2 are carbon slabs given the shape of rectangular blocks and placed at right angles to each other at arcing distance. The arcing space is placed in the field of the magnet N S, and this will hold the arc in the position A^1, its tendency being to go out of the magnetic field in a direction at right angles to the lines of force. If, however, the magnet is turned through 180°, so that the relative positions of the N and S poles are reversed, the arc will then go over to the position A^2 at the other side of the magnetic field. Evidently, then, if the magnet N S could be revolved or spun around the vertical middle line of the carbon slab C^1, then the arc would, in order to get out of the changing magnetic field, move to and fro across the lower edge of the vertical carbon, and thus be kept reciprocating as the magnet revolved.

It is not necessary to revolve the magnet, as described, to get this result, as it would do just as well to let the magnet remain fixed in position and reverse the magnetism periodically; there are always two ways of accomplishing the same result without moving any part; it matters not whether we put a direct current between electrodes and reverse the field magnetism periodically, or let the magnetism remain constant and periodically reverse the direction of the current between the electrodes. Thus, if we use an alternating current for the furnace work, an ordinary electro-magnet of unchanging polarity embracing the arcing space in its field will cause the arc to reciprocate from side to side with each reversal of the current direction.

Fig. 2 indicates a multiple arc furnace involving

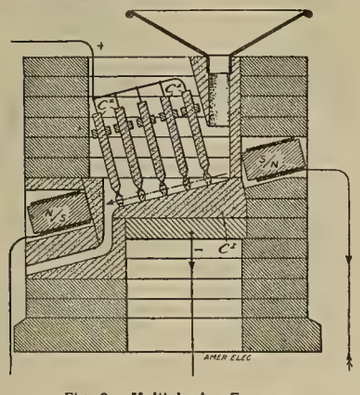


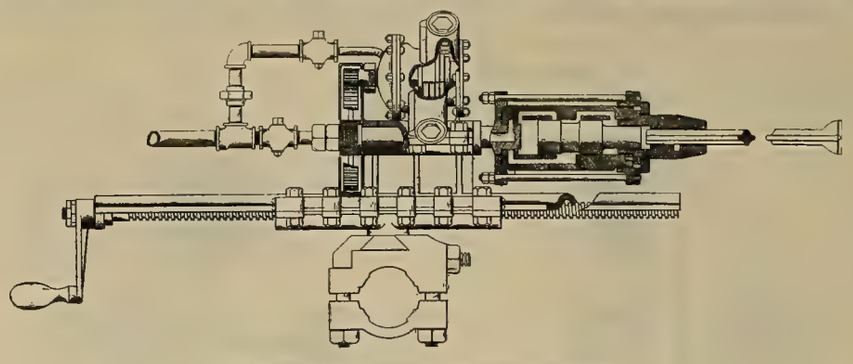
Fig. 2.—Multiple Arc Furnace.

this principle. A number of carbon slabs, C^1, are arranged parallel to each other, at right angles to another, C^2, that forms at the same time the inclined base of the furnace and an opposite electrode to all the others. The magnet N S is built into the furnace walls in such a position as to embrace all the arcs in its magnetic field. If direct current is used between electrodes to do the smelting, then the magnetism of the surface magnet is slowly reversed, causing the arcs to move to and fro across the furnace floors. An interesting variation is to connect the upper or vertical electrodes in series in such a way that the current flows up in one, and at the same time down in the next, and so on throughout the series. Under these conditions one arc will be going from right to left across the furnace base while the other is going in the opposite direction from left to right.

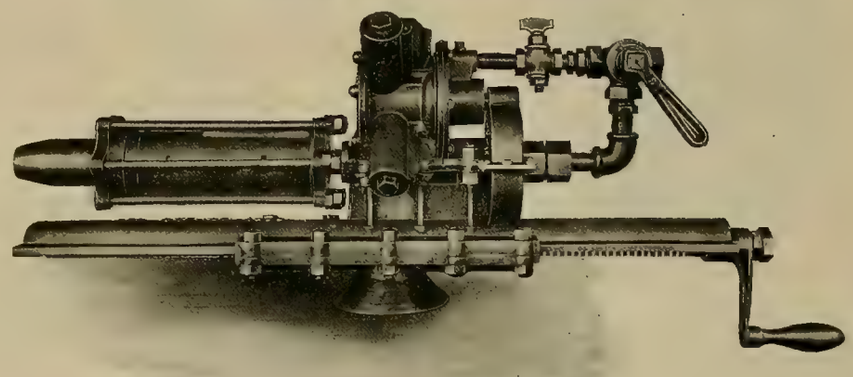
THE silver yield of British Columbia amounted in 1899 to 2,939,413 ounces, 4,292,401 ounces in 1898, value $1,663,708 and $2,375,841, respectively, a decline of value of nearly 30%. There was a simultaneous fall in the output of lead, usually there mined with silver together with combined ores, which was of value of $878,870, as against a worth of $1,077,581 in 1898. The decline in lead output value thus amounted to over 18%.

The Schmucker Pneumatic Rock Drill.

The Great Western Pneumatic Tool Co., of Denver, Colo., are manufacturing three sizes of the Schmucker drill, which are being tested in the various mining districts of Colorado. The size No. 1 weighs 35 pounds and strikes a blow equal to 31½ pounds; No. 2 weighs 55 pounds, delivering a blow of 49 pounds; No. 3 weighs 80 pounds, striking a 71-pound blow. The accompanying illustrations give a general idea of the



Sectional View Schmucker Pneumatic Rock Drill.



Schmucker Pneumatic Rock Drill.

mechanism of the drill. The manufacturers claim for it an air consumption of but 14 cubic feet of air per minute in size No. 1, 26 cubic feet for No. 2 and 34 cubic feet for No. 3. The hammer piston strikes, it is claimed, 4000 blows per minute. The diameter of hammer is 1⅛, 1 5/16 and 2⅛ inches, respectively, for the different sized drills; the length of feed is 18, 24 and 28 inches in the three different sizes, and will drive a hole from 4 to 12 feet.

The drill is rotated by a small four-cylinder engine, shown at the top of the machine, which operates independently of the striking device in the cylinder on the left. The engine shaft revolves at the rate of 812 revolutions per minute. A spiral steel sheath, surrounding the steel and rotating with it, acts like a wood bit in expelling the rock clippings from the hole as fast as they are made. By the lightness of the blow, it is claimed, a bit of maximum hardness can be used without breaking and thus reducing the wear.

WASCOTT.

Denver, Colo., June 25.

Discouraging Wholesale Filings.

Miners, generally, will applaud a recent decision of the Commissioner of the General Land Office, overruling a decision of the Register and Receiver of the Land Office at Prescott, Arizona. D. H. Moffatt had filed application for patent for thirty-nine mining claims and twenty-three millsites, all covered in the same application. M. Scanlan and others protested against the issuance of patent for two of the claims which covered the site of the town of White Hills, alleging that the required assessment work had not been performed, and that the land was non-mineral in character. The local Land Office decided for the claimant; the Commissioner of the General Land Office reversed those findings. We are not sufficiently acquainted with the facts in this particular case to correctly say which was right, but it is manifest that mining development and individual rights therein are often hindered by the attempt to monopolize and hold large areas with no intent to comply with the liberal requirements of Federal mining law. It is too common a practice to make a large number of mining locations, and tie up the tracts by disputed possession, often more with a view to the value of the timber thereon than with any idea of legitimate mineral development.

The Electrical Precipitation of Gold on Amalgamated Copper Plates.*

The precipitation of gold from cyanide solutions on mercury or on amalgamated copper plates by the aid of a current of electricity suggested itself to the inventors of the Siemens-Halske cyanide process before their results were published. Von Gernet, however, stated that such cathodes were unsuitable, the objections to their use being that mercury is too expensive, and that under the influence of the current, gold is forced into the interior of the copper plates, and forms dry amalgam, which does not adhere to the surface.

In the Pelatan-Clerici process, which was used at the DeLamar mill in Idaho in 1897 and 1898, the cathode consisted of a bath of mercury, but the density of the current is not stated. One of the difficulties encountered is said to have been that the gold passing through the bath of mercury adhered firmly to the copper plate lying beneath, and could not be easily detached. E. Andreoli, in 1897, spoke of the use of copper plates, but gave no details of his experience with them. In other patented processes the use of amalgamated plates is involved, and in one, the Keith process, the density 0.06 ampere per square foot of cathode is mentioned as suitable. In view of the discrepancies in the statements given above, it has appeared to the author of this paper that the results of some experiments made on the subject may be of interest to members of this Institution.

In some preliminary work it became evident that, as might be expected, the density of the current is the main factor which affects the electrolytic precipitation of gold on any cathode. The effects of the variation of the density of the current in depositing gold on mercury and on amalgamated copper cathodes were therefore studied, and subsequently lead and amalgamated copper were compared under similar conditions.

The details of these experiments were as follows:

No. 1.—Three baths were used, Nos. 1 and 2 containing as cathodes baths of mercury, each 20 square inches in area, with amalgamated copper plates lying submerged in them. No. 3 contained an amalgamated copper plate about 3¼ inches by 5 inches. The anodes were of the same size as the cathodes, and consisted of carbon in Nos. 1 and 3 and of iron in No. 2. The electrolytes were strong cyanide solutions, Nos. 1 and 2 containing 0.4%, and No. 3 0.7% KCy. In addition No. 1 contained 10% of common salt, and all three contained ten ounces of gold per ton. A current of 1.5 amperes per square foot was passed for 24 hours, the fall of potential in the baths being 1.7 volts, with a distance of 3 inches between the electrodes.

*A paper read by T. K. Rose before a recent meeting of the Institution of Mining and Metallurgy.

(TO BE CONTINUED.)

MINING SUMMARY.

ALASKA.

G. W. Garside, at the Sumdum Chief, has the 10-stamp mill crushing fifty tons of rock every twenty-four hours, running from $6 to $20 per ton. Forty men are employed.

ARIZONA.

COCHISE COUNTY.

The Copper B. M. Co. of Cochise, in the Dragoon district, has returns from a shipment, giving $64 copper, $1.95 and $5.70 silver.

At Johnsonville Hooker & Schwertner have bought the Magazine and Peoples Party claims from Osborn & Bigler for $30,000, ten per cent was paid cash, the balance in one year. The ore contains 20% copper and one ounce of silver to the ton.

MARICOPA COUNTY.

In the suit of S. R. H. Robinson against the Minnesota and Arizona C. Co. for services as superintendent from April 11, 1895, to September 5, 1898, at Phœnix, the jury rendered judgment for the plaintiff for $11,550. The defendant's estimate of the value of the superintendent's services during the existence of these contracts was about $75 per month.

MOJAVE COUNTY.

Near Chloride Supt. Botsford has ninety-six men at work.

At Kingman H. Lovin has sold his one-half interest at Little Meadows to T. Ewing for $2500.

YAVAPAI COUNTY.

The final payment of $38,750 was made last week to the former owners of the Cliff group of mines, near Jerome, consisting of seven claims, by the Treadwell M. Co.

Supt. Gunn says the shaft on the Copper Hill mine is 250 feet deep, and that he finds it difficult to get good miners.

The sale of the Congress mine has not been made. An option for $1,500,000 has been taken by promoters who hope to place the property.

The United Verde dividend of 75 cents per share on the 15th inst., amounting to $225,000, makes $375,000 this year and a total of $1,837,500.

J. L. Giroux of the United Verde mine at Jerome has bought claims adjoining Copete for W. A. Clark.

CALIFORNIA.

AMADOR COUNTY.

The Kirkwood M. Co. will begin work next Monday, July 2d. An upraise will be made from the tunnel to the surface, after which sinking will be continued to a depth of 1000 feet.

Record: The new shaft on the Fremont Con., at New Chicago, is down 300 feet; a hanging wall of greenstone has been encountered. A concrete shaft is being laid for the new hoisting works at the old shaft. Supt. Purrington hopes to have the new hoist running by the middle of July.——At the Gwin mine an ore body has been struck in the south drift of the 1600 level in the north shaft.

BUTTE COUNTY.

Blodgett & Grose, at Forbestown, will do the concrete work for a new 20-stamp mill at the Gold Bank mine.

CALAVERAS COUNTY.

A strike is reported at the Golden Eagle mine, at Jenny Lind.

At Campo Seco Mgr. Carpenter is operating the Berdina mine, owned by a New York company. The ore is very high in sulphurets and free gold.

EL DORADO COUNTY.

The Cambrian mine, at Lotus, is employing men who are developing the property. The 10-stamp mill is running night and day.

FRESNO COUNTY.

Fresno Democrat tells of a rig for drilling oil wells, the principle being that of a drill attached to the end of a 4-inch pipe, the latter being used as a shaft with which to turn the drill. As the depth is increased new lengths of pipe are added, the weight resting upon the drill, being regulated by the machinery on the surface. Into the top of the string of pipe is continually pumped a stream of water, which, under pressure, goes down through the pipe, and escaping through holes in the sides of the lower end of the pipe, comes up on the outside, bringing to the surface the drillings.——On the Florence property in the Kettleman hills this rig is said to have gone down 680 feet in forty-three hours, 80 feet through a siliceous formation struck at 470 feet, at the bottom of which was about 3 feet of quartz. The cost of the labor in the drilling of this well with this machine is stated to have been $370.

KERN COUNTY.

The Randsburg Exploration Co. has bought one-half the Clifton mine from Martin & Hill, of Garlock.

MADERA COUNTY.

W. H. Thomas, operating the smelter and copper-bearing properties at Dalton and Madera says of his California proposition that it has developed, and is responding in a manner equal to every expectation. He is putting through 120 tons of copper ore daily, and sending out ore that averages about 25%. He says the company will install a set of roasters.

MENDOCINO COUNTY.

C. W. Schumacher of Denver, Colo., is examining a manganese mine near Ukiah.

NEVADA COUNTY

The Reward G. M. Co. has levied an assessment of 2 cents per share, delinquent July 23.

PLACER COUNTY.

A contract is to be let to extend the Baker tunnel in the ground of the Blue Lead G. M. Co. of Dutch Flat.

Machinery is being transferred from the Gold Note mine, Grizzly Flats, to the Three Star mine, Auburn.

Colfax Sentinel: At the Pay Streak mine, Humbug Canyon, a 1200-foot flume 2x3 feet supplies power for a 5-stamp mill to be erected with provision for twenty stamps. The ledge averages 4 feet.——At the Pleasant and American Bar river mine, Middle Fork American below Michigan Bluff, the work of extending the tunnel is in progress.——The Blue Lead Gravel Co. of Dutch Flat have been taking out rich gravel. A contract will be let to extend the Baker tunnel. S. C. Jordan is Supt.——Rich gravel has been struck in the Dardanelles drift mine.——The stamp mill at the Rawhide mine, Texas Ridge, is running steadily.——Supt. Quigley has a new hoist in operation at the Glen gravel mine, near Bald Mountain. Ten men are employed.——At the Prairie Flower quartz mine at Canada Hill, 18 men are employed. A steam engine is being added to run the mill, which, it is expected, will be started by July 4th. The company is building a telephone line from the mine to the Forks House.

PLUMAS COUNTY.

In Kellogg ravine the quartz mine has forty men at work. Supt. Van Light expects to put up a 10-stamp mill. He has a rotary, and chlorination works.

The Rich Bar Gravel M. Co. has levied an assessment of 6 cents per share, delinquent July 30.

At the Little Jamison mine fifty-five men are employed; twenty stamps are crushing ore. The company has let a contract for 30,000 feet of timber and 25,000 spiling.

SANTA CLARA COUNTY.

The Quicksilver M. Co.'s report shows that on June 1 the company had cash on hand of $71,200 and quicksilver to the amount of $20,367, a total of $91,567. The company has no debt. The property worked is at New Almaden.

SHASTA COUNTY.

Free Press: The Minnesota Con. mine, Flat Creek district, between Keswick and Iron Mountain, has been bonded for sixty days by D. McCarthy of Keswick to Day & Caldwell of San Francisco for $60,000.

SIERRA COUNTY.

Operations have been resumed at the Harper mine, Forest City.

The Saddle Buttes has been bonded by P. Keeffe of Sonora.

SISKIYOU COUNTY.

Yreka Journal: A Pittsburg company has paid the bond held on the Sterling mine, Cottonwood district, and has bonded the Pool quartz mine, same locality, for $25,000. The Sterling mine has paid well during the prospecting term of bond, under the superintendency of S. J. Fore, hence the bonding of the Pool mine, with probability of buying the Hitt mine.

Work has started on the dredger in Yreka creek, near Hawkinsville.

TULARE COUNTY.

C. S. Cox of Yellow King M. Co. says they have a large body of high grade ore, the crosscut now in 8 feet of good ore. The company will put in steam-hoisting machinery and a quartz mill.

TRINITY COUNTY.

The mill at the Yellow Rose of Texas mine is running under the superintendency of George Carr of Carrville, who reports his Huntington mill satisfactorily working the talc.

TUOLUMNE COUNTY.

In the $25,000 suit of Mrs. C. Keast against the Santa Ysabel M. Co., in the Superior Court, the jury found for the plaintiff for $8000. Keast was working in the bottom of the Santa Ysabel shaft when he was struck and instantly killed by a timber which got away from the men who were about to lower it. It was argued that the accident was due to negligence, in that the hooks were not properly placed.

The Standard Con. of Bodie had bonded the Blue Bird mine, but the company threw up the bond after it had done considerable work. The Mono county papers say that recently 4 feet of good milling ore was struck only 10 feet from where the Standard Con. knocked off work on the vein.

COLORADO.

CLEAR CREEK COUNTY.

(Special Correspondence). — The Gold Fissure G. M. Co. are operating the Gold Fissure group of five claims. They are preparing to sink a 3-compartment shaft to 300 feet depth, erect a shaft house and put in hoisting machinery. They expect to cut a well-exploited ore body at 75 feet depth.

The Gold Dirt, leased to Cutting & Co., has been shipping for a year and run a concentrator on the property.

The Conqueror group is being operated, which includes a 40-ton mill.

The Silver Mountain has been operating for two years by two Boston ladies, who are making a success of it. It includes a well-equipped mill, in charge of F. G. Bishop.

Empire, June 25.

Regarding the Con. Stanley M. Co., an Idaho Springs correspondent says that the purchase price of the property was $750,000; that there was no commission to C. A. Gehrmann or any one else; that at a Chicago meeting of the stockholders a vote of confidence in C. A. Gehrmann was unanimously carried, and that the intending purchaser is in possession of the property and expresses his intention of making the final payment.

Idaho Springs Gazette: The Franklin County mine, near Lawson, is shipping 400-oz. silver ore.——The levels have been retimbered at the Senator at Dumont and the tramway connecting the mine with the mill is about finished. The company has completed the erection of the mill building, but the machinery has not arrived. Mgr. Kemp will work about forty men in development. He has the Blue Ridge and Senator mines in readiness for stoping. It is estimated that over 100,000 tons of mill ore is broken down ready for moving. Development of the two properties now aggregate several miles of levels.——Mgr. Ward is developing the Dover mine.——The John Owen M. & M. Co. propose to work the vein recently cut in the Newhouse tunnel.

CHAFFEE COUNTY.

Granite Pay Streak: At the Quo Vadis, Mgr. Corey is giving personal supervision to the mine.——Mgr. Barrick of the Magenta is expected to resume operations, when the shaft will be continued to a depth of 500 feet.——The lessees of the California have a vein with pay streak of 2½ feet milling ore, with a smaller streak of smelting ore.

DOLORES COUNTY.

Near Rico, F. A. McNeill sold to MacKinney, Thompson, Montgomery, Kim & Moore a one-fourth interest in the C. H. C. group of mines in Elk creek basin, and has bonded and leased them another one-quarter interest. The C. H. C. mines adjoin the Special Sessions group and are above timber line.

FREMONT COUNTY.

The Rocky Mountain Smelting Co. at Florence expect to be ready to begin Nov. 1. They will have two furnaces 36x180 inches each in dimensions, with a capacity of 250 tons each per day. The smelter building will be 235x75 feet, entirely of steel. The treatment is to be on copper-iron basis. F. R. Carpenter will be consultant engineer. They will not refine the matte.

GUNNISON COUNTY.

At Vulcan, Young & Baker are pushing the Oakland tunnel, developing the extension of the Humboldt vein.

The new hoister on the Vulcan mine is operating satisfactorily.

The Good Hope hoister will enable the company to go 1000 feet.

M. W. Johnson is sinking and timbering a shaft on the Jasper Chimney. Solfataric and geyser action give evidence of a chimney similar to that which appears on the Vulcan mine.

HINSDALE COUNTY.

In the vicinity of Lake City five working tunnels are under way; the longest will be 3000 feet when its objective point is reached. Two are being run by A. E. Reynolds to cut the Ocean Wave vein and tap the Lakeview.

The Hidden Treasure M. & T. Co. has bought the Dewey interest in the mine and mill, three-fourths, price $125,000 cash. P. C. McCarty is local manager. P. M. Holland, foreman. The new tunnel has been started. It will be run 4000 feet and will tap the ore bodies 640 feet below the present workings. Then the tramway will not be used any more. A twelve-drill air compressor will soon be added.

LAKE COUNTY.

(Special Correspondence).—In the issue of June 16, in Leadville correspondence, reference was made to royalties paid by Leadville lessees. The following is a fuller and more specific statement of the matter: On ores yielding up to $10 per ton, net smelter returns, 10%; $10 to $25 per ton, 15%; $25 to $50 per ton, 20%; $50 to $100 per ton, 25%; $100 to $150 per ton, 30%; all over $150 per ton, 35%. As indicated, all royalties are figured on net smelter returns.

Leadville, June 19.

(Special Correspondence).—The Nil Desperandum, on Rock hill, has a 600-foot shaft, from which drifting proceeds on the blue lime and porphyry contact. The ore there comprises lead carbonates, with some chloride of silver. No water is encountered at this depth. It is likely the shaft will be sunk, later, to the second contact, which it is thought will be reached at 250 feet greater depth.

Leadville, June 21.

PARK COUNTY.

A. S. Bedell has a dredging machine on Michigan creek at the foot of Mount Gill. It is an endless chain bucket dredge, built on a car with a 9x12 revolving table, cutting about 40 feet wide. The dirt is dry as it is cast upon the table, washed then from a centrifugal pump, which carries it to the sluices riffled to catch the coarse gold. The fine gold which escapes the riffles is to be amalgamated on galvanized copper plates at the end of the sluices. He expects to save all the black sand. The machine is built to daily handle 250 yards. He has 120 acres of ground that he thinks will average 25 cents a cubic yard.

PITKIN COUNTY.

(Special Correspondence).—The ore output of Aspen mines amounts to about 13,000 tons per month, consisting of one-eighth concentrates and two-thirds crude ore. The ores are lower grade than formerly, the bulk of the production being by lessees. The product averages 25% to 30% lime, with some iron, which is paid for by the smelters at the rate of 10 cents per unit; the smelter treatment being $3 per ton, this element of lime reduces it to about 50 cents per ton. The lead values probably do not average over 5%. Most of this, however, is reduced to a concentrate, the mills of Aspen shipping about 150 tons per day. The silver values in the crude ore run not over twenty-five ounces as an average. Royalties paid by lessees at Aspen range from 10% to 70%, but the average is about 25% on net smelter returns. WASCOTT.

Aspen, June 22.

SAGUACHE COUNTY.

The San Luis Valley L. & M. Co. will put in a mill at the Independent mine on the Baca grant. The Chapman company of Creede has contracted to transport 1800 tons of lumber and machinery for the mill.

SAN MIGUEL COUNTY.

In April the Tom Boy gold mines near Telluride raised and crushed 5000 tons of ore, yielding $52,000; concentrates shipped, 208 tons, from which the net profit was $2500; expenses for the month, $32,670, leaving a net profit of $23,300. The Tom Boy has purchased the Baby Elephant claim for $5000. The main office is in London.

At Telluride the Smuggler-Union M. Co. has bought the Newport placer, comprising 150 acres, for $12,000.

SAN JUAN COUNTY.

Standard: Grading from the Silverton Northerly Railway to the site of the Kendrick-Gelder smelter is completed. Twenty-four men are grading for the smelter buildings.——At the Henrietta mine, the copper properties of the Paradox M. Co., in Prospect Basin, has twenty-eight miners at work.

SUMMIT COUNTY.

Breckenridge Journal: Four steam-power churn-drills are at work on the placers owned by or under option to the Gold Pan M. Co.

TELLER COUNTY.

W. S. Stratton is now locally credited with intention to sink two shafts, each 3000 feet deep, one on the Logan, the other on the American Eagle, near Victor.

T. A. Rickard, consulting engineer Stratton's Independence, Ltd., from Victor, says that the mine produced during the first year of the new company, ending April 30, 1900, 37,987 tons ore, worth $2,786,255, or $73.35 per ton=3⅜ ounces gold per ton.

Mgr. Wm. Newell of the Cripple Creek-Buffalo G. M. Co., which has driven a tunnel 3000 feet into Grouse mountain from the surface, has decided to go to a depth of 1000 feet, connecting with the tunnel.

IDAHO.

ADA COUNTY.

The next session of the International Mining Congress will be held at Boise.

BLAINE COUNTY.

Burr Rumsey is Supt. the Fisher mine, below White's hot springs, Sawtooth City,

vhere a mill is to be built. Mr. McEntyre vill superintend the construction of this nill. Part of the machinery is already on he ground and the remainder will arrive by the time it is needed.

CANYON COUNTY.

Ex-Gov. McConnell says his company has "almost decided to build a smelter at Tampa."

LATAH COUNTY.

At Moscow is organized the White Cross M. Co., D. S. Elder secretary, to work property of the company on Moscow mountain, 10 miles from Moscow. The ore body is 2 feet wide and assays $22.

SHOSHONE COUNTY.

B. N. Hillard and A. Hight have deeded to the Cœur d' Alene M. Co. the placer claims, water rights, pipe line, etc., on Eagle and Pritchard creeks. The amounts named in the deed are nominal, but the revenue stamps attached amount to $1000, indicating an actual value of $1,000,000. The properties include 100 placer claims, a dozen water rights, covering practically all the headwaters of Pritchard creek, and the pipe line of the Spokane H. M. Co., from Raven below Murray, five miles. The pipe is 16 inches in diameter.

At Mullan Larsen & Greenough, owners of the Morning and lessees of the You Like mines, have acquired a controlling interest in the Gold Hunter mine and mill.

At Burke the Standard M. Co. is putting in a crosscut tunnel, branching off from the Campbell tunnel, 1500 feet from the portal, leaving that tunnel at an angle of 66°, which is calculated to reach the standard vein in about 1000 feet, also cutting it 1000 feet east of the Campbell tunnel, the two crosscut tunnels and the drift in the vein making an equilateral triangle, the object being to cut off 1000 feet of the haul on the ore from that vicinity by following one angle of the triangle instead of two.

At the Custer mine a tunnel 2000 feet is now in progress from the Nine Mile side, to cut below the old workings, from which the Custer shipped ore steadily for years.

At Wallace the Bimetallic M. Co. is running a 550-foot tunnel on its Nine Mile property.

The Mayflower M. Co. at Wallace—H. E. King, H. E. Howes, R. N. Dunn, W. H. Billingham—will operate.

WASHINGTON COUNTY.

At Cuprum hoisting machinery for the Blue Jacket mine is installed. Ore is hauled to the railroad for shipment to the smelter.

MICHIGAN.

Houghton reports that the average of a number of assays of stamp sand or tailings from the Franklin mill was $\frac{5}{8}$ of 1% copper, and that the process recently introduced there for separating this copper from the sand is a success. Those interested believe they will be able to secure $\frac{5}{8}$, or ten pounds of ingot copper, from each ton of sand.

MONTANA.

MADISON COUNTY.

At Rochester there are fifty men employed in the Wauseka mine.

A strike on the Bradley claim on Mill Creek, 10 miles east of Sheridan, shows a solid ledge 2 feet in width, the ore assaying $000 to the ton.

NEVADA.

DOUGLAS COUNTY.

Wilder & Jessen have bonded their mine in Red Canyon district for $10,000 to John R. Loosley of San Francisco, who has let a contract to run a tunnel 100 feet.

ESMERALDA COUNTY.

At Siegelville, the new hoisting engine in operation; ten more men have been put on.

HUMBOLDT COUNTY.

Supt. Terhune, resident manager and supt. at Golconda of the G. & W. E. Co., says the smelters are running at full capacity. The miners at the Adelaide have been laid off, but most of the men have been put to work on the company's Copper Canyon and Copper Basin mines.

LANDER COUNTY.

The management of the Battle Mountain Co.'s property will begin the sinking of a main shaft: a gasoline hoist will be put in.

The Tenabo Co., of Cortez, has raised the wages of the miners from $2.50 to $2.75.

LINCOLN COUNTY.

From Salt Lake comes an unlikely rumor that the De Lamar and the April Fool at De Lamar are considering the consolidation of two properties.

The Homestake and Sheeptrail mining companies have each a 20-stamp mill located a mile from the bank of the Colorado river. A pumping plant on that river supplies the mills with water.

STOREY COUNTY.

J. Fisher has bought for $1000 the ore tailings at the base of the Sierra Nevada mine waste dump from the Sierra Nevada M. Co. and will haul them to his cyanide mill in Six-mile canyon. The tailings pile contains 17,000 tons and will net $5000.

WASHOE COUNTY.

Reno reports the Wedekind ore assays: Main ledge, $1207.80; side of ledge, $265.14; country rock, $7 to $18.75. A cut has been run 64 feet. The ore has been breasted out for 27 feet and exposed 17 feet. Mr. Wedekind shipped 2525 pounds to Salt Lake and received $187.67 net for it. Six tons and 209 pounds were milled at the Reno Reduction Works; $1200 in bullion was the result. The rock is rotten quartzite. It carries horn and chloride of silver. The gold is free milling.

WHITE PINE COUNTY.

The Rocco-Homestake M. Co., of Hamilton, has decided to make no more lead shipments and ordered all its ores banked at the E. & P. depot. The company is employing twenty-one men at the mine; eleven teams are hauling ore to Eureka. The cut in price from the original $4.57½ to the present quotation means a loss to the company of $12 per ton.

NEW MEXICO.

GRANT COUNTY.

Recently a corps of mining engineers, assayers, surveyors and prospectors was organized in Denver, Colo., by Terry & Ginger for a three years' trip through New Mexico, Arizona and Old Mexico. Boston men are back of the enterprise. They report some findings in the vicinity of Silver City.

LINCOLN COUNTY.

A strike is reported in the Old Abe gold mine, White Oaks.

SOCORRO COUNTY.

The Graphic mine and smelter is employing 200 men at Kelly and Magdalena. The mine and smelter are 1 mile apart, connected by an ore-car tramway, having a descent from the mine to the smelter of 500 feet. Stopes show a very regular wall formation in most places in the mine, and it is substantially timbered with stulls. The output varies from 75 to 100 tons of material per day. Near the main tunnel entrance are extensive lime quarries, from which the lime needed at the smelter is cheaply obtained. The mine is opened by means of six levels about 100 feet apart vertically. There seems to be one vein in the upper levels and two parallel veins from the third to the sixth levels. The veins have a 45° dip and are from 5 to 50 feet wide, standing within a limestone belt, bounded by shale on one side and quartzite on the other. The ores comprise iron pyrites, red and brown hematites, magnetic and lead carbonates, and sulphides, with important silver values in the lead. Some copper is also found. On the sixth level is a large body of zinc sulphide, none of which is being mined at present. Much of the tonnage is of high-grade sand carbonates, consisting of lead crystals of sand fineness. The iron ores, which occur in large bodies, are of value for fluxing material. The smelter is equipped with a 42x120-inch lead furnace, with a reduction capacity of 100 tons of ore per day. About ten cars of bullion are produced per month, besides a small amount of copper matte. Steel water jackets are used and are supplied with water from a 3-inch pipe line.

OREGON.

BAKER COUNTY.

The North American M. Co. at Copper Butte, 18 miles northeast of Baker City, has received machinery to go down 3000 feet.

Baker City is arranging for holding a mining congress in September.

The Burnt River G. M. & D. Co. is to build an electric plant to cost $75,000, 600 H. P., with capacity for operating mills, hoists and lighting mine.

GRANT COUNTY.

Copper has been discovered in the New El Dorado mining section, 10 miles west of Granite, near Susanville. L. W. Kempf says the copper ore in his Wisconsin mine is encased and in contact with slate, diorite, serpentine, porphyry and phonolite.

At the Red Boy mine Supt. Meikle expects to soon have the $50,000 hoisting plant installed to sink to the 2000-foot level.

At the May Queen mine Manager Thomsen has temporarily shut down the mill.

JOSEPHINE COUNTY.

The clean-up at the placer mine of Wimer Bros. & Co., at Waldo, is reported to be $20,000. The run was from Nov. 1 to June 1.

Hackler & Prinzanlar of Pasadena, Cal., have started up their $46,000 steam dredger in Rogue river, near Tolo.

PENNSYLVANIA.

The annual report of J. E. Roderick, chief of the Bureau of Mines, for the year 1899 shows that there was produced during that period 54,034,224 tons of coal in the anthracite region of this State and 73,066,943 tons in the bituminous region. The average number of days worked in the anthracite region was 120 and 296 in the bituminous region. Mr. Roderick says the dangers resulting from the mining of anthracite coal are constantly increasing, and he suggests that the English-speaking employes can help greatly to reduce the number of accidents by being careful and vigilant in the performance of their duties, thereby setting an example to their fellow workmen who are not familiar with the English language. He asserts that the use of electricity in any form in coal mines, especially in the bituminous regions, is a menace to life and property. There were 366 mines in operation in 1899 in the anthracite regions, giving employment to 140,583 persons, and 776 mines in the bituminous district, employing 91,442 persons. Mr. Roderick agrees with the mine inspectors that more than half of the accidents in the mines are due to carelessness of the victims themselves. He suggests that the number of mine-inspecting districts in the bituminous regions be increased from ten to twelve.

UTAH.

JUAB COUNTY.

Gen. Mgr. Geddes of the Swansea M. Co. shows that during the year for which his report is made his company marketed 12,262 tons of ore that yielded 478,700 ounces silver and 1,985,680 pounds of lead, the ore averaging forty ounces of silver with 8.32% lead per ton; amount paid company after deducting working charges at smelter and freight, $17.52 per ton; cost of extraction, $6.70 per ton; net receipts per ton, $10.82; that during the year 2112 feet of development work was done below 550-foot level.

SUMMIT COUNTY.

The annual report of the Ontario mine to December 31, 1899, shows that at that time the company had a reserve of $450,545.27. Other items include sulphides of silver, value $28,688.91; ores at the mine, value $29,252.52. The profits for the year were $130,667.12.

WASHINGTON.

FERRY COUNTY.

The mill of the Republic Reduction Co. is working $10 ore from the Black Tail, San Poil, Pearl and Ben Hur.

The Mountain Lion's cleanup averages $1000 per day, or $30,000 for the month.

At Republic ore rich in silver is reported in the Quilp.

Free gold ore is being taken out of the north drift on the intermediate level of the San Poil.

The two-compartment shaft on the Butte & Boston is down 200 feet.

The Chico mine shaft is 300 feet deep; Supt., R. H. Hewitt.

SKAMANIA COUNTY.

Supt. J. W. Spaulding is pushing exploration work on the Cannonball on Baker creek, Christina lake district, near Cascade. The company is expending $20,000 in development work.

SNOHOMISH COUNTY.

M. Swinerton at Silverton is general manager and Supt. Imperial M. Co. in Anacortes gulch. A tunnel carries a pay streak in copper and silver.

FOREIGN.

AUSTRALIA.

Australia's gold production for 1899 was 4,458,997 ounces, as follows:

Colonies.	1899 Production. Ounces.	Values.
Western Australia	1,643,876	£6,246,728
Victoria	854,500	3,418,000
Queensland	947,626	2,850,000
New South Wales	509,418	1,765,390
New Zealand	389,585	1,513,242
Tasmania	83,992	327,545
South Australia	30,000	119,000
Totals	4,458,997	£16,239,905

Queensland's comparatively small increase in gold output was to some extent the result of prolonged drought. The yield from the cyanidation of tailings is noticeable; one-third of the whole returns is due to this process.

BRITISH COLUMBIA.

The Granby smelter is completed, except the water power.

Following are official returns from the Ymir mine for April: Three thousand tons milled, producing 1657 ounces of bullion and 175 tons of concentrates; shipped 94 tons of concentrates; total receipts for month, $22,031; expenses, $7763.

Mgr. McDonald says that for the four weeks ending May 19th he shipped to the smelter from the Le Roi 13,216 tons of ore, value $219,000, cost per ton for mining, development, smelting, refining and realization expenses, $8 per ton, which would indicate a profit of $8.60 per ton. The mine is understood to be earning profits at the rate of $1,500,000 per annum.

At Fort Steele in the Sullivan the force is to be increased. Surveys for a tramway from the mine to the railroad on Mark creek are being made.

In Deadwood camp, in the Boundary district, the B. C. C. Co., owning the Mother Lode mine, is building a 300-ton smelter at Greenwood. F. Keffer is general manager. R. Liden is in charge of the smelter construction work. By October the work will be completed and the smelter blown in.

Shipments of ore from the B. C. mine, Summit camp, to the Trail smelter, average two carloads daily.

A. L. White, Montreal representative Graves-Miner Syndicate, is touring the various camps of the Boundary.

H. N. Galer made the last payment of $12,500 on the Hartford claim, Wellington camp, to Rogers & Jones. Total amount of bond, $35,000.

The report of the British Columbia Minister of Mines shows that the mineral production has risen from $2,608,803 in 1890 to $12,393,131 in 1899, this production made up of gold $4,202,473, coal $3,882,396, silver $1,663,708, copper $1,351,453, lead $878,870. Trail creek stands first, production $3,229,086; the Slocan next, $1,740,372; Nelson third, $879,185; Ainsworth fourth, $297,930; Osoyoos fifth, $234,167. Placer mining jumped to $1,334,900, caused by Atlin district, which produced $800,000.

Copper was produced during 1899 to the amount of 7,722,591 pounds, an increase of 6% over 1898, 75% of which came from Rossland. Silver-lead shows a material decrease; the tonnage in 1898 was 30,691; 21,507 in 1899. Silver production amounted to 2,939,413 ounces, a decrease of 1,357,619 ounces from 1898; the lead production was 21,862,436 pounds; 31,693,559 in 1898.

The Trail smelter has been kept going by ores from the Slocan, East Kootenay and the Boundary district, from which it has been receiving 750 tons ore daily.

LOWER CALIFORNIA.

A. W. Davis of the Viznaga mine is in San Diego with a bar of bullion from the new cyanide plant. It weighs 105 ounces.

H. Playter of Alamo, reports a strike in the Grande mine at that place.

In the Alamo section the Sterling mines, operated by Pittsburg capital, has high grade ore.

F. E. Russell at Alamo has started up work on the Aurora and Montezuma mines.

MEXICO.

Production of matte has ceased at La Cananea, pending the erection of a new smelter and the installation of modern machinery.

In the State of Sonora, at the Mulatos mine, Sahuaripa district, the mill is being put in order and a new smelter is to be erected, the whole giving employment to 500 men.

G. A. Tibbetts of Bakersfield, Cal., in the Soyopa region, Ures district, has denounced a copper mine.

At the Zubiate mine, 15 miles east of Minas Prietas, a triple compartment shaft is being sunk and a hoist with a sinking capacity of 3000 feet is being put in.

At Guerrero del Oro, H. J. Rose, Supt. Niven properties, is pushing the development. The mines are the Guerrero del Oro, San Jorge and San Agustin. The former has been extended 600 feet within three months. The San Jorge property is a contact of diorite and slate, a wet vein, producing sulphide of silver.

THE KLONDIKE.

Under date of May 21st, R. C. Diehl reports the following prices at Dawson: Milk, three cans for $1; eggs, wholesale, $45 a case; sugar, 16 cents per pound; salt, 10 cents; ham, 60 cents retail, 47½ cents wholesale; bacon, same as ham; tomatoes, $12 per case; all fruits 50 cents per can, except strawberries, which are 75 cents; flour, $14 to $16 per cwt.; onions, $1 a pound; potatoes, 75 cents per pound retail, 55 cents wholesale.

Catalogues Received.

THE Jackson Drill & Mfg. Co., Denver, Colo., have issued a neat catalogue (No. 12) describing that make of hand-power drill, giving good illustrations of the drill at work in various underground positions; also, with sectional view showing its mechanism.

THE 1900 catalogue of the Detroit Lubricator Co. gives illustrated specifications of its modern makes of lubricators, indicators, oilers and valves, with prices. Address, for free copy, Detroit Lubricator Co., Detroit, Mich.

Personal.

JNO. HAYS HAMMOND is in New York City.

J. L. GRIMES is the new Supt. Bellevue Con. mine, Ophir, Cal.

WM. ORR has returned to Salt Lake City from Denver, Colo.

GEO. BANCROFT, a Colorado mining engineer, is visiting San Francisco.

D. G. SPAR is now Supt. Mulatos mine, Sahuaripa district, Sonora, Mexico.

G. S. HOLMES has returned from Calaveras county, Cal., to Bingham, Utah.

B. S. SCHLESSINGER is now Supt. Hilda Co.'s mines at Fairplay, Park Co., Colo.

R. T. WHITE, Supt. Highland Boy, Utah, smelter, has returned from Montana.

W. E. HOWELL is succeeded as Supt. of the Pilgrim mine, Sierra Co., Cal., by A. Bixby.

C. P. SCHUMACHER, mining man of Leadville and Denver, Colo., is in San Francisco.

JNO. CARROLL of Singapore is inspecting mining methods and machinery at Grass Valley, Cal.

J. GEO. LEYNER, machinist and manufacturer, Denver, Colo., has returned from Milwaukee, Wis.

J. P. MUNGER is now Supt. Harvard mine, Jamestown, Cal. Thirty stamps are in operation at the mill.

GEORGE KISLINGBURY has returned to Berkeley, Cal., from an extended examination of mining properties.

AT the Quincy mine, Park City, Utah, J. G. Rhoden is succeeded in the direction of affairs by M. C. Harrington.

FRANK SUTHERLAND, formerly of San Francisco, has gone to Cape Nome in the interest of Colorado mining men.

W. H. SHELL is Supt. Pinto mine, Victor, Colo., succeeding F. Johnson, who becomes Supt. Hull City placer mine.

BERTRAM HUNT, who has been in northern Australia since September, 1898, has returned to San Francisco.

E. B. ROGERS of White, Rogers & Co., 306 Pine St., San Francisco, has returned to San Francisco from a business trip.

JOS. DEDERICHS, now at San Bernardino, Cal., has the contract for the erection of the Republic, Wash., mill.

F. E. SHEPARD, president of the Denver Engineering Works, expects to return from Boston, Mass., to Denver about July 1st.

H. C. LANGREHR has returned to San Francisco from southeastern Alaska, where he located forty-three mining claims.

JAS. DAVIS, Denver, Colo., representative of the Lima, Ohio, Locomotive Works, has returned to Denver from the Pacific coast.

GEORGE H. ELDRIDGE of the United States Geological Survey is to be deputed to examine and report on the petroleum fields of California.

F. L. BOSQUI, Supt. Liberty Bell, Telluride, Colo., cyanide plant, has been appointed Supt. of the works to succeed Carl Anderson, who goes to Arizona.

W. C. RALSTON, president California Miners' Association, will this summer reside at the Melones mine, Calaveras Co., Cal., to give it his personal attention.

R. M. JONES, electrical engineer, formerly of Salt Lake City, Utah, has charge of the construction of the electrical plant of the Pike's Peak Power Co., near Victor, Colo.

LEE COCHRANE, formerly with Mine and Smelter Supply Co., of Denver, Salt Lake and Mexico City, now travels for the Standard Fire Brick Co. of Pueblo and Denver.

THE Dexter G. M. Co., Tuscarora, Nev., has offered J. Whittaker of Virginia City, Mont., the position of Supt. of its 40-stamp mill, which was declined, as Mr. W. is operating on his own account.

DUNCAN MCVICHIE, late Supt. De La Mar's Mercur, Utah, mines, has accepted the management of the Bingham Copper and Gold Mining Co.'s Bingham mines, and all other propositions controlled by the Coram-Posey syndicate of Boston, and takes charge to-day.

K. G. BRUNNBERG of the Grangesberg iron mines, Sweden, is visiting the Lake Superior country and is locally quoted as wanting to see American mining machinery and methods. He says: "It is generally conceded that American mining machinery is the best produced in the world to-day, and we are going to equip our mines with gigantic plants of up-to-date American machinery."

CAPT. J. J. HEALY has resigned the management of the North American Trading Co. He will go to Nome and thence, he says, to Siberia, where he has a concession from the Russian Government that he considers valuable. His successor is Jno. Isom.

MARION DE VRIES is at Stockton, Cal. Regarding the California Mineral Land bill, he says: "The bill received the consent and united attention of the Secretary of the Interior, the Commissioner of the General Land Office and the delegation during this session with the result that the Hermann bill was agreed upon and favorably reported to the House. This bill in many respects is better than the Idaho-Montana act, and in my judgment in no respects inferior to that act. The bill was strongly pressed for a hearing when reported, and during the session. It is to be regretted that such could not be had. There is no reason why this bill should not become a law early in the short session of Congress, and in my judgment the well-directed efforts of the California Miners' Association will accomplish this most desirable result."

Commercial Paragraphs.

THE Union Gas Engine Co. of San Francisco is building a 300 H. P. gas engine.

MILLER & BUCHANAN of Denver, Colo., are to make the drills for the new Electric Drill Co.

FLINT & LOMAX, Denver, Colo., are filling an order for 10,000 oil cans for machinists.

MOCK & GARSIDE of Denver, Colo., are manufacturing steam and compressed air elevators for buildings.

HERMAN A. RYER has opened a branch store in Denver, Colo., for Howe, Brown & Co., steel manufacturers.

THE Standard Fire Brick Co. of Pueblo and Denver, Colo., are enlarging their plant at Pueblo to add tile and sewer-pipe works.

THE Franz-McRay Iron Works Co., Denver, Colo., have arranged to become the manufacturers of Lambing's hydraulic mining riffles.

SKINNER & SETHMAN, Denver, Colo., recently put in an electric lighting plant at Rawlins, Wyo.; also a hoisting plant at a Leadville mine.

ECCLES & SMITH are agents for the Griffin Wheel Co. in San Francisco. This company have shops in Chicago, St. Paul, Tacoma and Denver.

FAIRBANKS, MORSE & CO., through their Denver house, are supplying the Nabob G. M. Co. mine at Whitehorn, Colo., with machinery for a larger operating plant.

TWENTY-TWO miners from Nevada county, Cal., have gone to Honolulu to sink shafts for the Risdon Iron Works of San Francisco on sugar plantations, in charge of J. T. Leatham.

W. H. EMANUEL, Denver, Colo., recently sold a Robins conveyor to the Iowa G. M. Co. at Silverton, Colo.; also a 60 H. P. horizontal tubular boiler, with feed pump, to the Ago M. Co. in Arizona.

ON Monday of last week the Robt. Aitchison Perforated Metal Co. of Chicago received in their first mail orders from Vermont, Utah, Minnesota and Louisiana, showing that this company is well known from one end of the country to the other.

MCFARLANE & CO., Denver, Colo., have just finished a steel smokestack for the Gold Coin Co. at Cripple Creek, which is 14 feet diameter at the base, tapering to 7 feet at the top, and 138 feet high, the steel plates being $\frac{7}{16}$-inch thick at base and $\frac{1}{4}$-inch at top.

R. M. STEWART, Denver representative of the Crocker-Wheeler Co., is to furnish the electrical supplies for the Rocky Mountain Smelter at Florence, Colo., consisting in part of a 110 K. W. generator, four motors of 60, 28, 15 and 15 H. P. respectively; also a switchboard and eight arc lamps.

THE Denver Engineering Works have built two Loder hot blast furnaces for the Boston Gold & Copper Smelting Co. at Leadville; also one set of 14x27 rolls for the Iowa Gold M. & M. Co. at Silverton, Colo., and ten 15 H. P. and four 30 H. P. electric hoists for properties in Cripple Creek district. They shipped last week ten carloads of machinery and equipment to Utah for the Bingham Gold & Copper Co., including three matte smelting furnaces, slag pots, matte pots and fore hearths. They report an order for one of their new type 12x16 geared steam hoists. They are enlarging their foundry, making its capacity one-third larger. It will include new plast furnace and core ovens. They are issuing a new catalogue giving information on electric hoists, with working data as to electrical transmission.

A. MIDDLEBROOK, manager Denver branch Jeanesville Iron Works Co., reports sale of compound pump to city of Grand Junction, Colo., of 1,500,000 gallons per day capacity; also order from Mexico for compound condensing mine pump, and G. B. sinker, for Victor Fuel Co., two electric station pumps for B. & M. mine, Ward, Colo., and high lift station pump for Leadville.

WM. AINSWORTH & SONS, Denver, Colo., recently sent a consignment of assay balances and Brunton transits to their South African agent at Johannesburg, being the first of their shipments to that country since hostilities began—a larger order than usual. Messrs. Ainsworth report that the Alaskan expedition of the U. S. Geological Survey was provided with Brunton transits from their shops.

THE Pneumatic Cyanide Process Co., of Denver, Colo., have sold to the Salzer-Ford M. & M. Co., at Bear, Idaho, the exclusive right to the use of that process in Idaho and Washington counties, Idaho, and Union and Baker counties, Oregon. A milling right to use the same process has also been sold to the Red Warrior Chief G. M. Co., at Rocky Bar, Idaho, where that company is erecting a 50-ton cyanide plant.

CONSUL BRITTAIN at Nantes, France, says: "Inquiry has been made at this consulate for prices (by the ton) of lead and zinc of all descriptions. American manufacturers of these metals are requested to correspond with M. Albert Brosseau of 4 Rue Cambronne, Nantes, France, and submit prices. Samples of sheet zinc and small blocks of lead may be sent through the mails. Prices should be stated in francs and centimes, and the metric system should be used in giving weights and measures."

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING JUNE 19, 1900.

651,824.—TRACE FASTENER—F. T. Cambern, Walla Walla, Wash.

652,081.—MANUFACTURE OF GAS—J. W. Chisholm, San Francisco.

652,082.—WATER GAS GENERATOR—J. W. Chisholm, San Francisco.

652,086.—PROWSHARE—C. C. Coffinberry, Union, Or.

652,232.—FIRE DEFLATOR—C. A. Culp, Pacific Grove, Cal.

651,853.—STORAGE BATTERY—Hanscom & Hough, San Francisco.

652,227.—FURNACE—A. Heberer, Alameda, Cal.

651,861.—ROTARY ENGINE—J. B. Kelly, Portland, Or.

651,862.—MOTOR—J. B. Kelly, Portland, Or.

651,863.—VALVE GEAR—J. B. Kelly, Portland, Or.

651,864.—PISTON—J. B. Kelly, Portland, Or.

651,865.—CROSSCUT SAW—J. B. Kelly, Portland, Or.

652,228.—VALVE REGULATOR—J. B. Kelly, Portland, Or.

652,123.—PROPELLER—P. G. Lavigne, Napa, Cal.

651,948.—FILTER—R. P. Lawson, Los Angeles, Cal.

651,944.—SCREWDRIVER—T. R. Lillie, Lodi, Cal.

652,217.—ELECTRIC BELT—M. A. McLaughlin, Los Angeles, Cal.

651,950.—BOOK—S. M. Morden, Portland, Or.

651,974.—GRAIN DOOR—J. C., R. A. & W. J. Munro, Sedro Woolley, Wash.

651,928.—UPHOLSTERY—E. G. Neuman, Ferndale, Cal.

653,143.—WATER ELEVATOR—H. Room, Ophir, Wash.

651,956.—PISTON PACKING RINGS—R. E. Strait, Sacramento, Cal.

652,054.—CARBURETING LAMP—A. L. Taber, Corona, Cal.

651,957.—PLASTERING COLUMNS—J. R. Tobin, San Francisco.

651,958.—MAIL BOX—G. Trevett, San Jose, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

WEIGHT MEASURER AND CUTTER FOR CHEESE.—No. 651,507. June 12, 1900. Louis Lacaille, Golden Gate, Cal. This invention relates to a device for accurately measuring the sizes of cuts so that by such measurement the cheese may be cut to the exact weight called by for the customer. It consists of a cheese case composed of two hollow semi-cylindrical segments, each formed with closed ends, one segment, being turnable within the other. Means are provided for fixing the outer segment upon which the cheese is supported concentrically with said bottom and turnable therewith. A knife having one end fulcrumed near the center of the top of the case is movable in a radial slot in the bottom of the outer segment and adapted to swing downwardly to cut through the cheese. Around the periphery is supported a scale which being applied to the cheese, shows the weight of any particular measurement upon the scale after the unit of any particular size of cheese has been ascertained. It enables the seller to exactly measure the size of the cut to correspond with the weight desired.

HYDRAULIC REVETING MACHINE.—No. 651,503. June 12, 1900. Stanton Foreman, Sacramento, Cal. Assignor to the Schaw, Ingram & Batcher Co., of same place. This invention relates to an apparatus for riveting the longitudinal overlapping seams for the formtion of pipe on joints, and is especially adapted for the smaller sizes of pipe on account of the difficulty in obtaining sufficient strength and rigidity of the unsupported end of small mandrels. It consists of a stationary frame with an arm or support, and a mandrel united at the rear and separated at the front, a fluid pressure ram upon the arm or support with a heading tool carried thereby, a yielding plate closing device and an internal heading tool carried by the mandrel, these tools operating at right angles to the arm or support, and connections with a source of pressure supply so that the upper heading tool is depressed. Other connections are located within the mandrel by which pressure is supplied simultaneously to act upon the plate closer so that the plates are clamped between it and the upper heading tool, after which the plate closer is moved backwardly by superior pressure upon the heading tool to allow the rivet to contact with the inner head-forming tool. In connection with this device is a carriage and mechanism by which the carriage is advanced a distance equal to that between the rivet holes after the setting of each rivet. There is also a supplemental slide by which more exact adjustments of the carrier and pipe may be made to riveting tools.

APPARATUS FOR SECURING PISTON PACKING RINGS.—No. 651,956. June 19, 1900. R. E. Strait, Sacramento. This invention consists in a means for forming a tight joint in preparing the packing of a piston by which the valve controlling the various air passages of an automatic air brake is operated. The piston is channeled around the periphery and is adapted to receive a snap or packing ring which fits into the channel and is designed to make a tight joint with the interior of the cylinder. Experience shows that in the operation and wear of parts, the packing joint becomes leaky, and it is necessary to fit a new ring but by various causes the channel becomes open so that the new rings which are kept in stock will not fit perfectly. My invention comprises a surface plate or bed having a central opening for the projecting end of the piston, which has a segmental edge and this edge rests upon the plate or bed. A cylinder is adapted to rest with one end around the edge of the opposite part of the piston and by means of a plate resting upon the upper portion of the cylinder, and bolts or screws the periphery of the piston may be compressed so as to again fit the interposed packing.

Recently Declared Mining Dividends.

Paris Belle G. M. Co., B. C., $4000..June 26
New Almaden Q. M. Co., Cal, one-half of 1%.....July 16

This Paper Fifty-Two Times, POST PAID, $3.00

Latest Market Reports.

SAN FRANCISCO, June 28, 1900.

SILVER—Per oz., Troy: London, 28½d (standard ounce, 925 fine); New York, bar silver, 61¾c (1000 fine); San Francisco, 61¾c; Mexican dollars, 50c.

COPPER.—New York: Lake, 1 to 3 casks, 16.65 cash; carload lots, 16.25; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.12½; Casting, 1 to 3 casks, 16.37½; carload lots, 16.00. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.22½; Salt Lake City, 4.00; St. Louis, $4.00; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 7, sheet 8, bar 6c. London, £17 10s = 3.80c per ℔.

New York this week reports an advance of ½ of a cent a pound in the price of lead made by the American Smelting & Refining Co.

Lead interests are inclined to believe that further advances will follow, as the recent heavy decline in prices was greater than conditions warranted.

The advance in silver to 61¾ cents comes at the same time, and is credited to a demand from China and Oriental countries, due to some extent to the Eastern political situation.

There is an idea that still further advances in silver, as well as in lead, will follow. If such advances should put lead to 5 cents per pound and silver 65 cents per ounce, it would mean much to the silver-lead mining interests of the country.

The duty on lead is 2½ cents per pound, and none has been imported except in ore for several years. The duty on lead in ores is 1½ cents per pound. The exports of pig lead for ten months ending April 2, 1900, were 246,552 pounds, valued at $11,182; for the fiscal year ending in 1897 there were 15,632,455 pounds, valued at $710,907. Producers of lead ore are said to believe that, by increasing the export trade, the American Smelting & Refining Co. could get better prices at home and could then pay producers more for their ore.

SPELTER. — New York, $4.25; St. Louis, $4.10; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY. — New York, 10c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON. — Pittsburg, pig, No. 2, foundry, $19.50; gray forge, $18.00; San Francisco, bar, per lb., 3c.

STEEL. — Billets, Pittsburg, $27.50; bars, $30.50; San Francisco, bar, 11c to 18c per lb.

QUICKSILVER. — New York, $51.00; London, £9 10s; San Francisco, local, $49.50 ℔ flask of 76½ lbs.; Export, $47.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER. — Half-and-half, 100-lb. lots, 20¼c; San Francisco, Plumbers', 100-lb. lots, 17c.

BABBITT METAL.— San Francisco, No. 1, 10c.

TIN.—New York, pig, $30.00; San Francisco, ton lots, 31½c; 1000 lbs., 32c; 500 lbs., 33c; less, 34c; bar tin, ℔ lb, 37c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

BISMUTH.—New York, ℔ lb., $1.60 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

NICKEL.—New York, 50@60c ℔ lb.

TUNGSTEN.—New York, ℔ lb., $1; San Francisco, $1.25.

FERRO-TUNGSTEN. — New York, 37%, 40c; San Francisco, 75c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, $125.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 33@35c ℔ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 66% B, 2c ℔ lb.; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 45@50c ℔ lb.

CANDLES.—Granite 6s, 16 oz., 50s., 11¾c ℔ set; 14 oz., 40s., 10½c.

NAILS.—List prices per keg: No. 20d to 60d, wire, $3.70; cut, $3.70; 10d to 16d, wire, $3.75; cut, $3.75; 8d, wire, $3.80; cut, $3.80; 6d and 7d, wire, $3.90; cut, $3.90; 4d and 5d, wire, $4; cut, $4; 3d, wire, $4.15; cut, $4.15; 2d, wire, $4.40; cut, $4.40. Special rates on carload lots.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 28, 1900.

9:30 A. M. SESSION.

300 C. C. & V..$1 60	200 Ophir 72c
300 New York...02c	300 ....71c

2:30 P. M. SESSION.

800 B. & B.....27c	100 Savage.....16c
100 C. C. & V..$1 55	200 Sierra Nev..30c

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
309 MARKET STREET, SAN FRANCISCO, CAL.

Atlin Gold Fields,

British Columbia. Of particular interest to HYDRAULIC OPERATORS and experienced QUARTZ PROSPECTORS. American miners can pre-empt claims. For further particulars write BROWNLEE & LOWRY, Civil and Hydraulic Engineers and Land Surveyors, Atlin, British Columbia.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, SALT LAKE CITY, UTAH.

Notice of Application for Dissolution.

In the Superior Court in and for the City and County of San Francisco, State of California.

In the Matter of the Voluntary Dissolution of the South Paloma Gold Mining Company, Limited. (a corporation.)

Notice is hereby given that the South Paloma Gold Mining Company, Limited, a corporation created and existing under the laws of the State of California, has presented to the Superior Court of the City and County of San Francisco, State of California, a petition praying for a judgment and decree declaring the said corporation dissolved according to law; and that said application will be heard on TUESDAY, the 31st day of July, 1900, at 10 o'clock of said day, or as soon thereafter as counsel can be heard, at the court room of said Superior Court, Department No. 3 thereof, at the New City Hall, in the city and county aforesaid.

Witness my hand and the seal of said Court the 25th day of June, A. D. 1900.

WM. A. DEANE, Clerk.
(SEAL)
By JOSEPH RIORDAN, Deputy Clerk.

WRIGHT & LUKENS,
Attorneys for Petitioner,
222 Sansome Street.

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

SITUATIONS WANTED.

WANTED.—POSITION AS SUPERINTENDENT or manager of mine or mill by graduate of Michigan College of Mines, with four years' practical experience as superintendent of mine and mills. Speak some Spanish. Address E. W. D., 759 Wealthy Ave., Grand Rapids, Mich.

AN EXPERIENCED MINER AND MILL MAN desires position. Fifteen years' practical experience. Ten years mill work. Understands amalgamating, concentrators and assaying. Particular attention paid to saving fine gold. Thoroughly competent. Address MILL MAN, care this office.

WANTED—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

MINE SUPERINTENDENT, TEN YEARS' experience in Michigan, Montana and Idaho, desires engagement as Supt. or manager of developing or producing property in this country or abroad. Best of reference. Address D. C., care this office.

POSITION WANTED TO MANAGE A MINE and mill. Years of experience. Thoroughly practical, pushing and energetic. Handle men with skill and economy. First class testimonials as to integrity, etc. Address SKILL, this office.

ALVIN PHILLIPS & CO.,

Chemists, Mining and Metallurgical Engineers,

1761 MARKET STREET,

DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO

Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

RICH DRIFT MINE IN PLACER COUNTY.

Wanted, parties with capital to purchase an interest in a large rich gold mine, or to work on percentage. Address H. H., Mining and Scientific Press.

SAVE THE DROPS

Few articles of American manufacture can boast extensive use in more than three or four European countries, but

CROSS OIL FILTERS

can be found in the best equipped plants all over the civilized world.

They save 50% of oil bills. That's why. Sent on 30 days' approval.

Catalogue 38.

THE BURT MFG. CO.,
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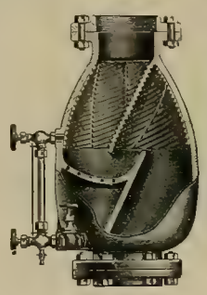
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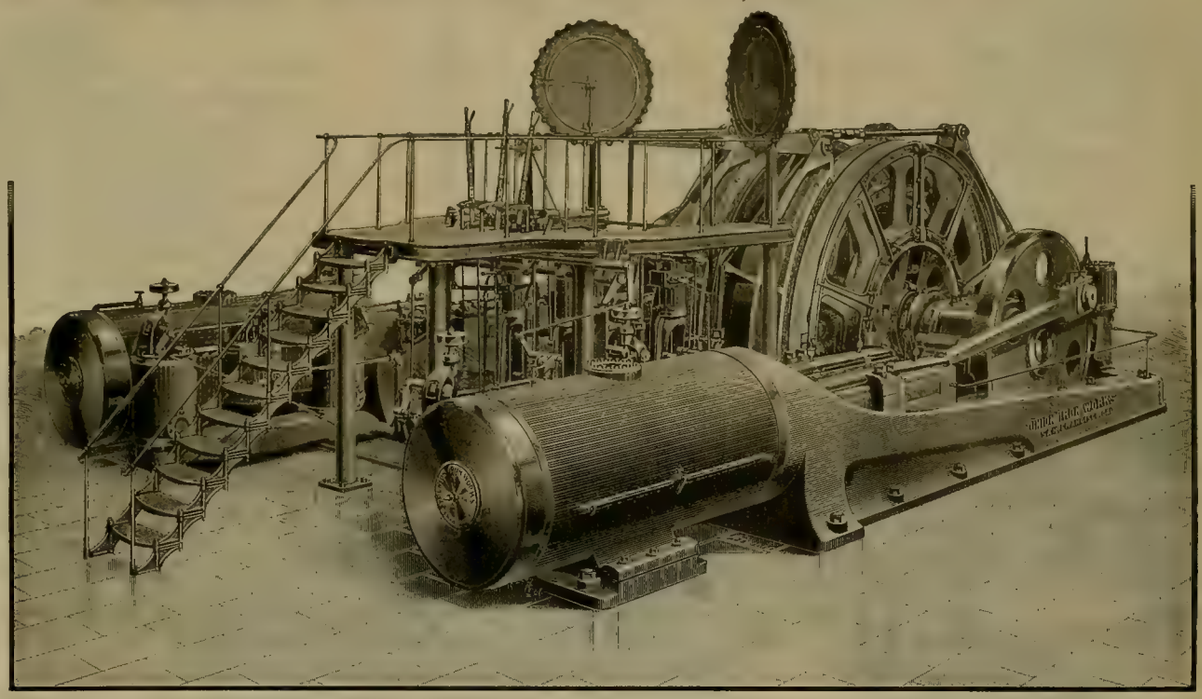
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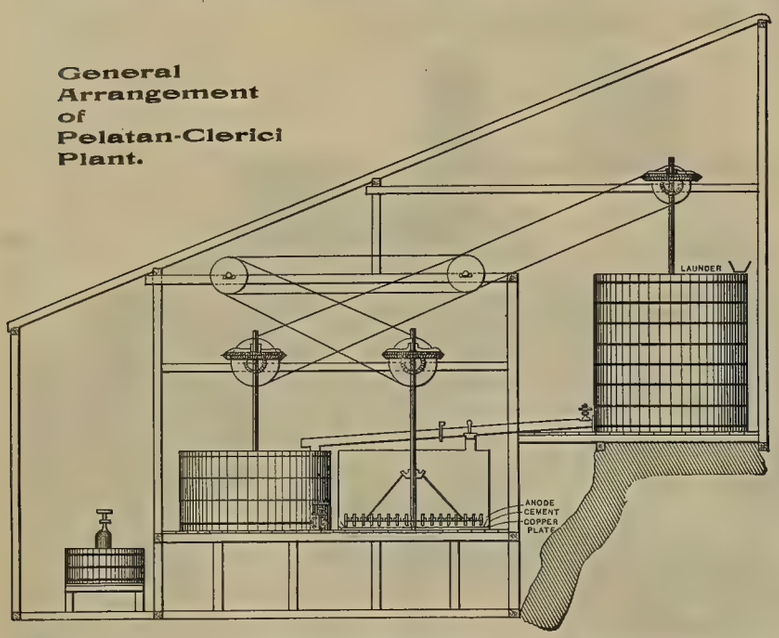
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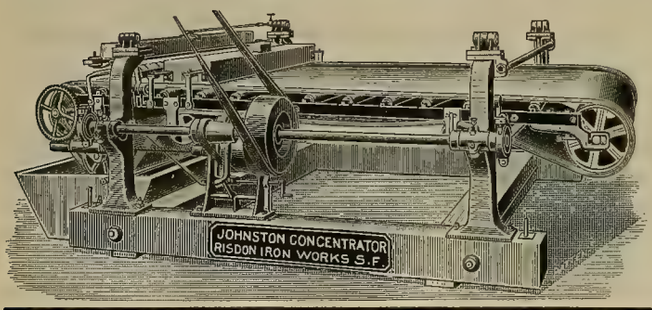
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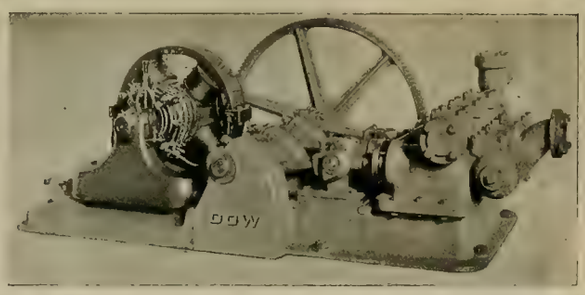
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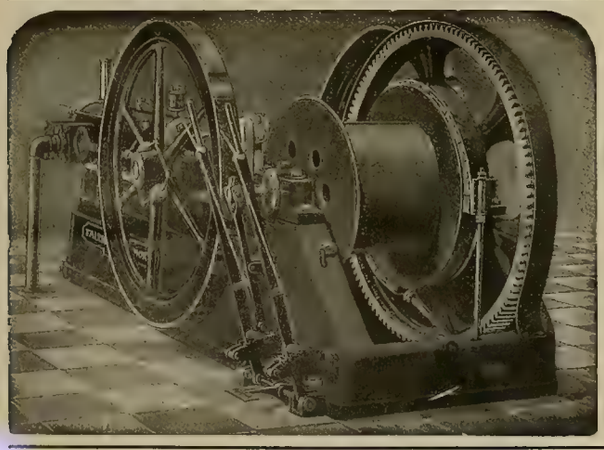
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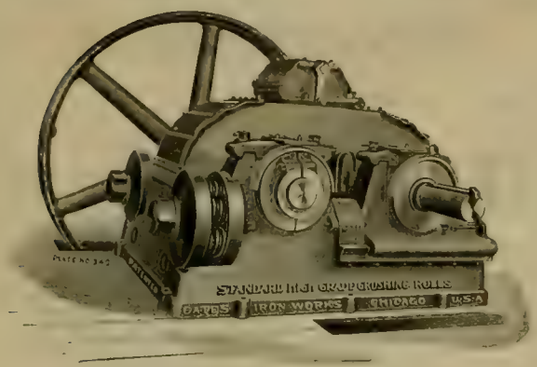
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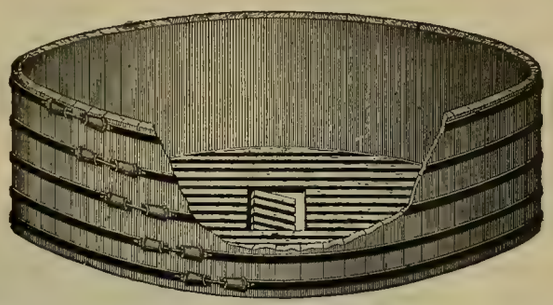
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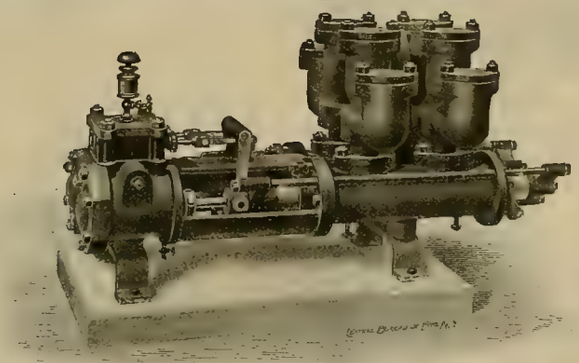
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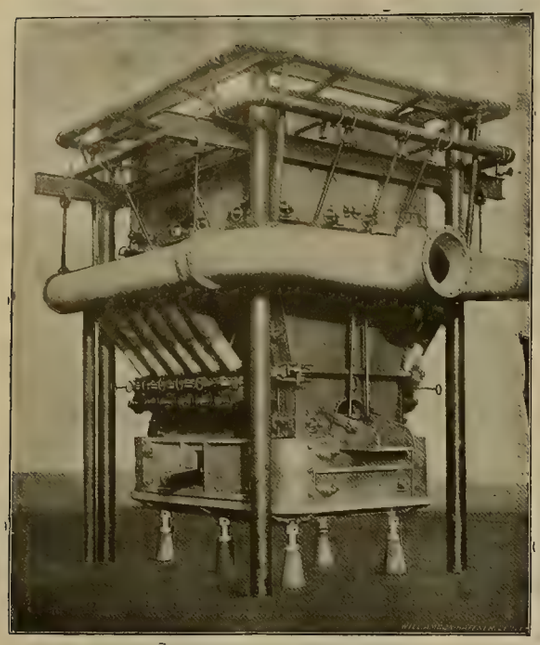
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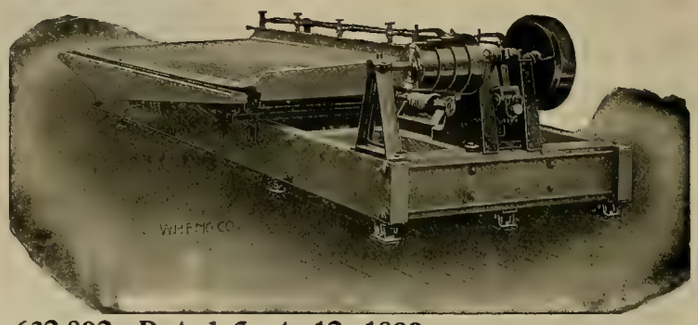
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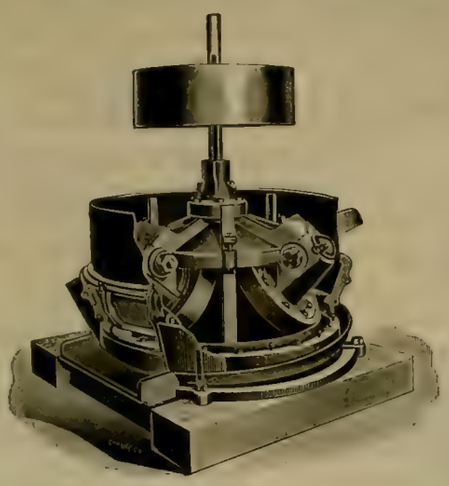
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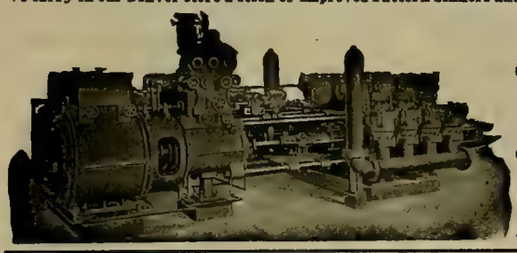
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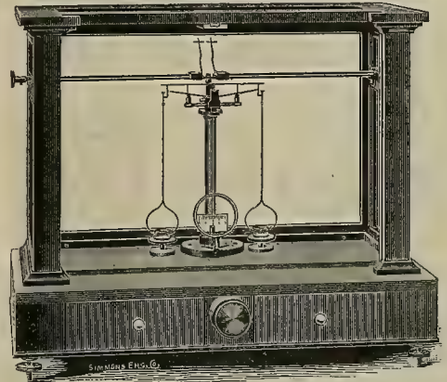
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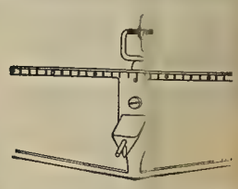
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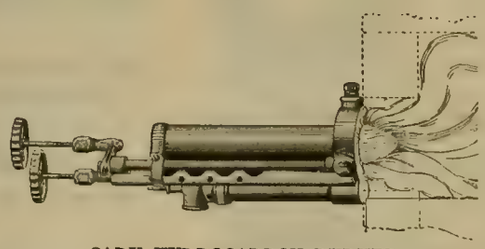
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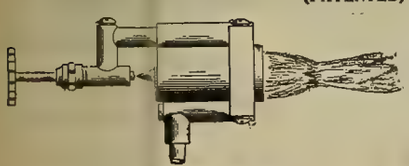
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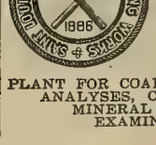
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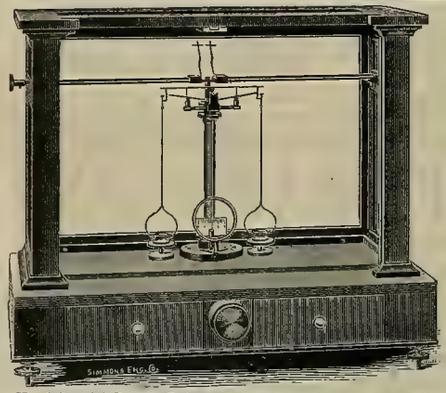
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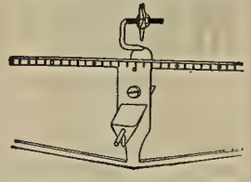
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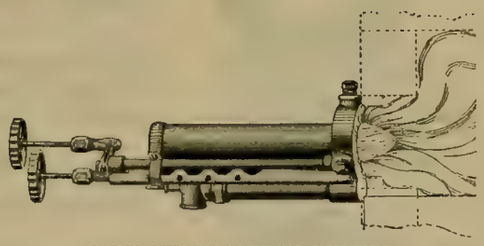
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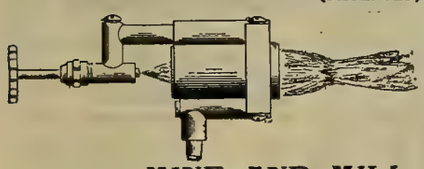
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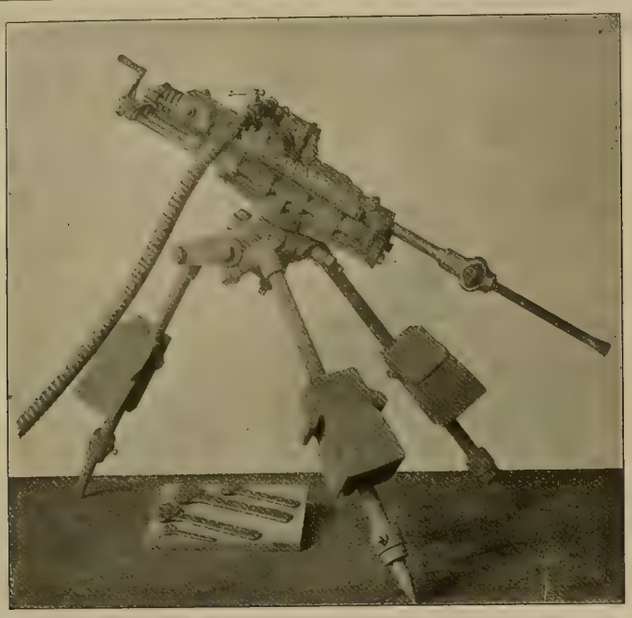
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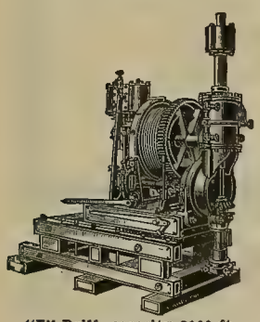
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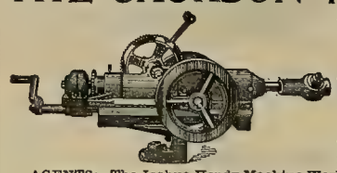
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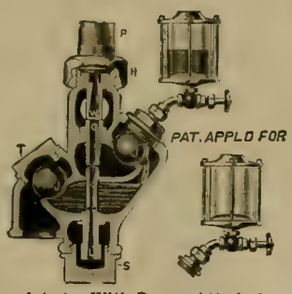
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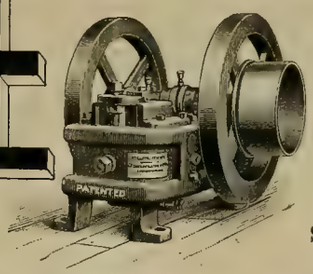


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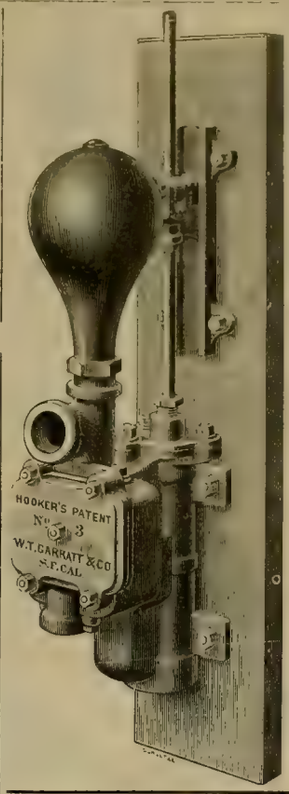
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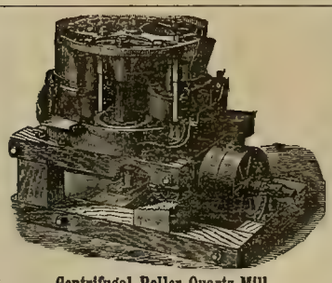
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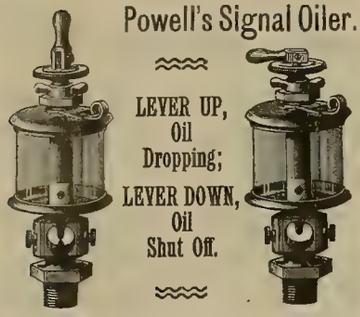
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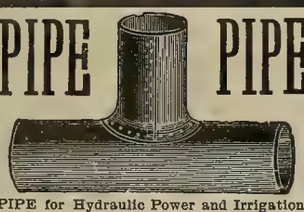
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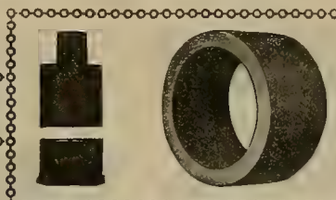
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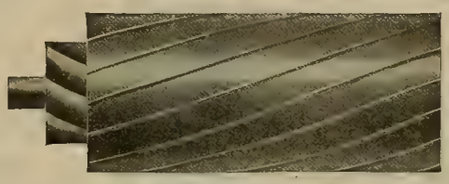
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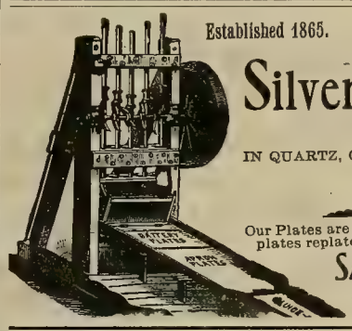
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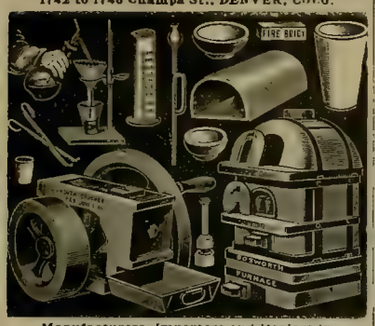
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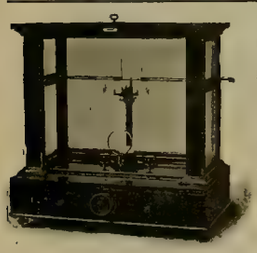
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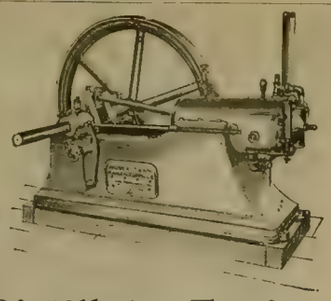
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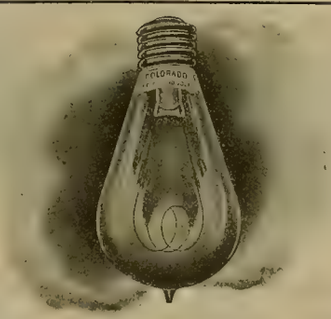
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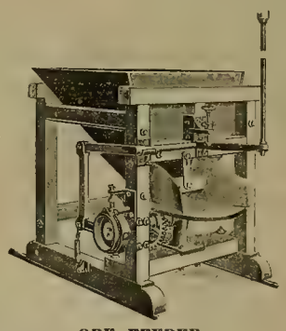
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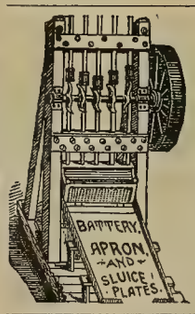
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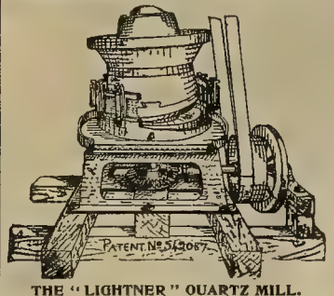


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ASSESSMENT NOTICES.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of June, 1900, an assessment of seventeen and one-half (17½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of August, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNAY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of May, 1900, an assessment (No. 23) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 21st day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of May, 1900, an assessment (No. 3) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 310 Pine street, room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of July, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 30th day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—310 Pine street, rooms 36, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of June, 1900, an assessment (No. 12) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of July, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of August, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

DELINQUENT SALE NOTICE.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 8th day of May, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Richard Rising	409	1,000	$ 50 00
W. H. Langford	628	500	50 00
Inman Sealby	614	2,000	200 00
Reese Llewellyn	414	200	20 00

And in accordance with law, and an order from the Board of Directors, made on the 8th day of May, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 213 Jackson street, San Francisco, California, on WEDNESDAY, the 11th day of July, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. MIDDLETON, Secretary.

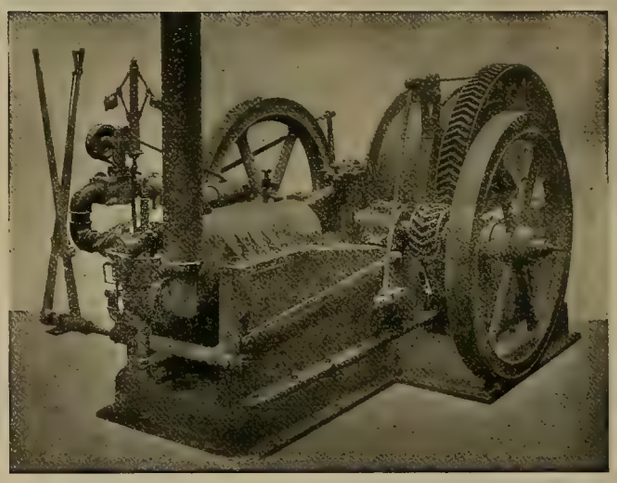
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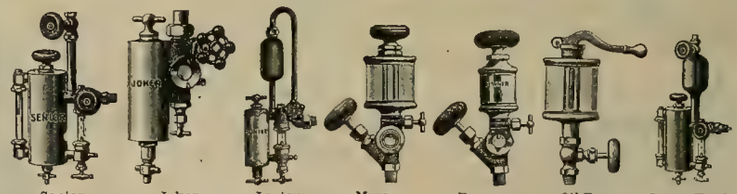
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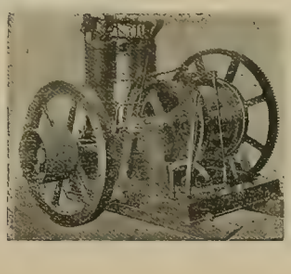


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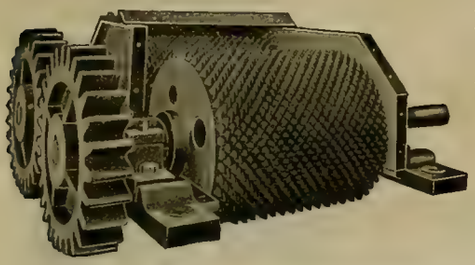
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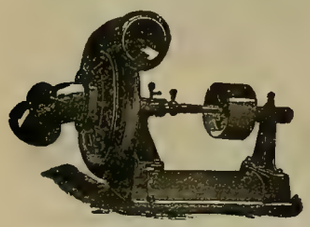


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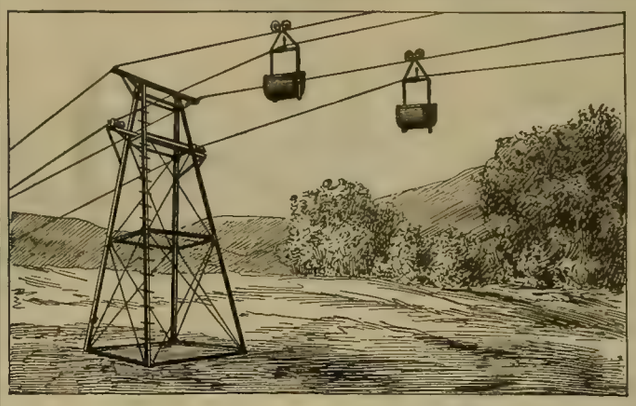
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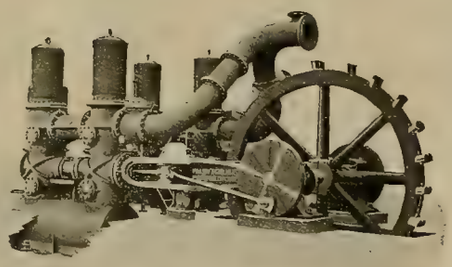
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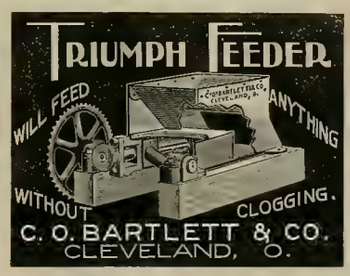
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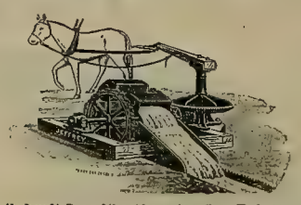
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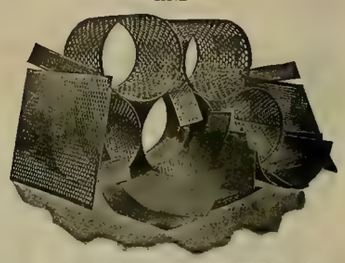
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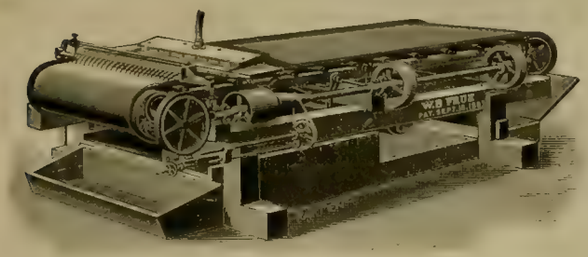
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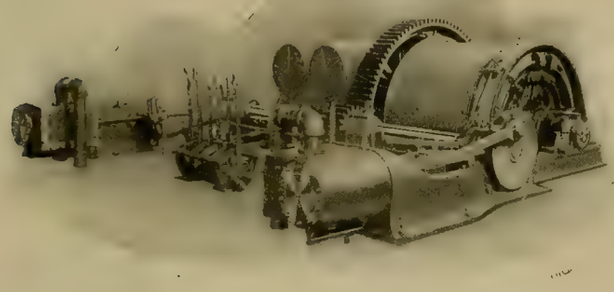
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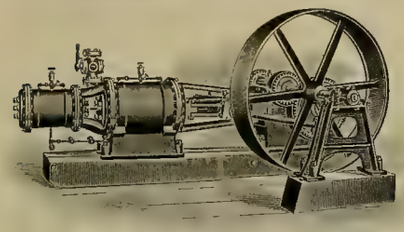
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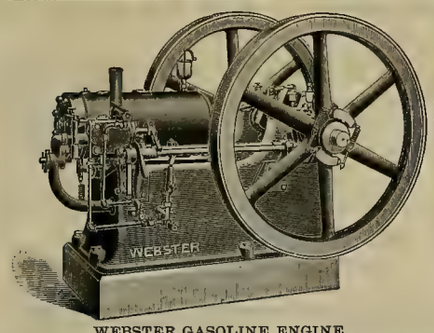
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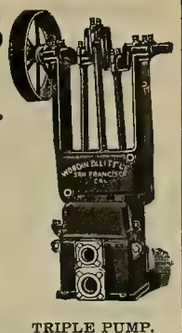




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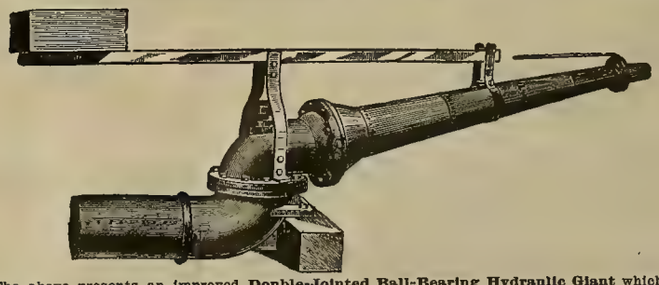
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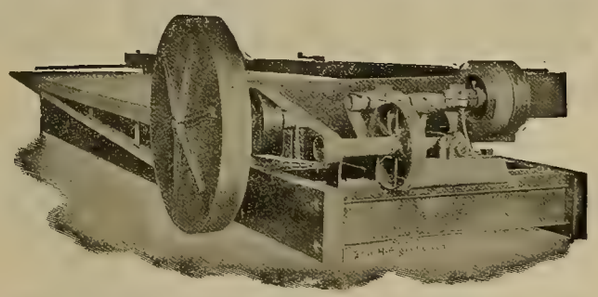
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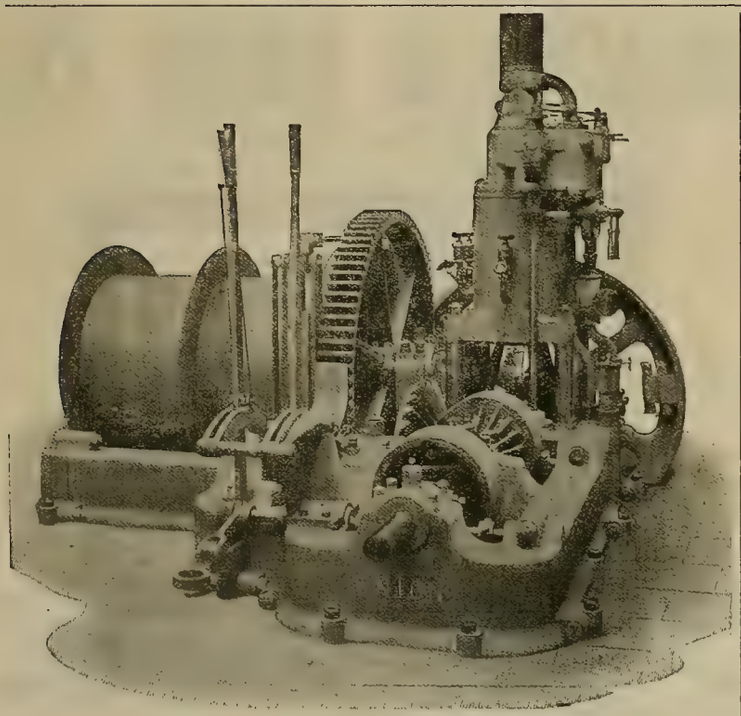
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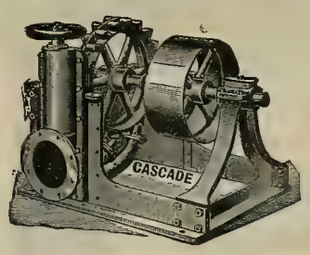
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